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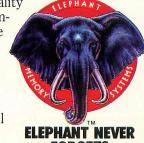
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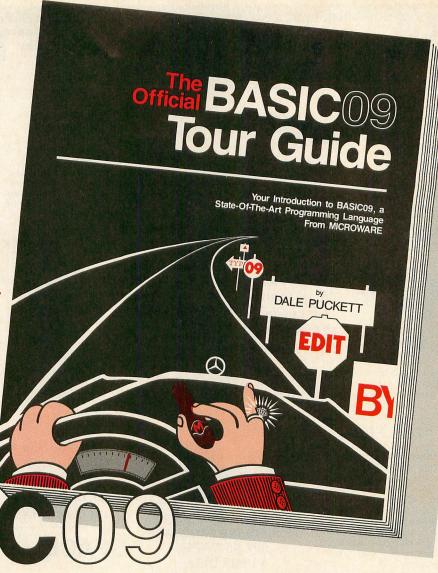
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\*\*\*ARCADE ACTION\*\*\*

This one will give you hours of exciting play. . . Cross the busy highway to the safety of the median and rest awhile before you set out across the swollen river teaming with hidden hazards. Outstanding sound and graphics.



**16K MACHINE LANGUAGE** \$27.95 TAPE \$30.95 DISK

"TRAPFALL"

By KEN KALISH

\*\*\*ARCADE ACTION\*\*\*

The "Pitfalls" in this game are many. Hidden

treasures, jump over the

pits, swing on the vine,

watch out for alligators,

beware of the scorpion. Another game for the Color Computer with the

same high resolution graphics as "The King."

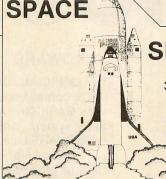
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like the popular arcade game "DEFENDER" Tape \$24.95 32K Machine Code

COLOR GOLF - Now sit at your computer and play nine or eighteen holes. Outstanding graphics in the fairway or on the green. Helps your game.32K Extended Basic

'YAAZEE" (C) 1983 - Yaazee is a 2 player game using five dice to get the best poker hand. After game is loaded flashing digit below player number determines which player rolls dice at the start of the game. 16K Machine Language Ext. Basic

BIRD ATTACK - A fast paced machine language arcade game. Shoot the birdmen before they descend upon you. Watch out for their bombs! 16K Machine Language

MAZE RACE - Maze race is a one or two player game. Play either against the built in timer or against your favorite opponent. 16K Machine Code

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#### **FEATURES**

20/Color Computing For Kids by Jean Plesser (Education) (Tape Loader; 4K Color) A game for Dad and some special sound. (Hardware) 26/Internal Modem by Mark Marsten

A neat way to hook up your modem. (General)

30/Grey Flannel by William Barden, Jr. A few thoughts on business and the Color Computer. (Utility) 37/Patching Scripsit by Ashok Basargekar

A faster method. (Tape Loader; 32K Color) 38/Scripsit Redone by Ralph Tenny (Utility) (Tape Loader; 32K Disk) A better method.

49/Statistics: A Tutorial by David Dawson (Tutorial) (Tape Loader; 16K Extended) Making the muddy clear.

(Home Finance) 63/Investor's Analyst by Daniel Jamet (Tape Loader; 16K Extended) Financial analysis for home or small business. 69/Sorcerer's Puzzles by Richard Ramella (Game)

(Tape Loader; 4K Color, 16K Color; and 16K Extended) The Gridleys' visit. 89/More Summer Project Winners (Game)

(16K Color) Fly — Another Winner! 96/AND, OR, NOT by Jon Schild (Tutorial)

Discovering Boolean functions. (Utility) 98/Custom Color by Dennis Kitsz The last piece of Color Burner.

(Utility) 106/Dissecting Your ROM Part ten of a 14-part series.

119/The Devil's Disk Editor by William Barden, Jr. (Tutorial) The last part of a series on disks.



4/PEEK (06,84)

7/INKEY\$

10/DEFUSR by Terry Kepner

**16/GOTO School** by Dr. Paul Kimmelman

123/On-Line by Wayne Day

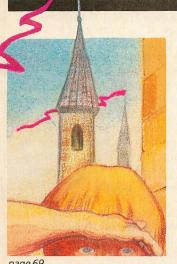
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140/NEW:PRODUCT\$

142/END OF FILE

142/FOR...NEXT (07,84)

"Barden Means Business," by Rich Grote



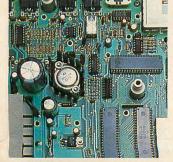
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## PEEK (06,84)



usiness isn't a topic you'd expect to hear connected with our Color Computer — our micro wasn't designed as a business machine, and, let's face it, the kinds of business programs that most businessmen require aren't available for it.

But that doesn't mean you can't use your Color Computer for your small business, or home business, or the personal business you do in connection with your home and finances. You just have to look harder for good business programs than would an IBM PC user, and you have to be a little more ingenious than a PC user knows how to be... but that's what sets us, and our computer, apart, isn't it?

To help in your search for creative business programs, we've gathered some special articles to get you on your way. GOTO 30 to read a few words by Bill Barden on the Color Computer and business; thus fortified, GOTO 37 and 38 for a double-dose of Scripsit improvements. One will speed-up Color Scripsit (for those of you with little time to spare). The second will help you prepare mailing labels. Now let's look at the most serious side of business (or home finance): money. GOTO 63 for a program that will help you analyze market options like a pro, and GOTO 49 to learn how statistics can help you plug this information into a formula that will produce decision-facilitating data.

Once you have your business and finances under control, you'll need a break. This month we have two excellent pastime activities for you: GOTO 89 for Fly!, a Summer Project Winner that will convince you those nasty buzzing critters were created by a CPU; then GOTO 69 for Sorcerer's Puzzles, and see how your logic paths are operating this month.

June brings with it the end of school and Father's Day. Your kids will want to study this month's Color Computing For Kids (GOTO 20) to plan their Father's Day treat, and we should all take a trip with Paul Kimmelman in GOTO School for some summertime possibilities (GOTO 16).

Last month I promised the ends of some series, and here they are: GOTO 98 for the last program for Color Burner, and GOTO 119 for the final half of the Devil's Disk Editor. GOTO 106 for a series that's drawing closer to its end: Jake's ROM dissection, version 1.0.

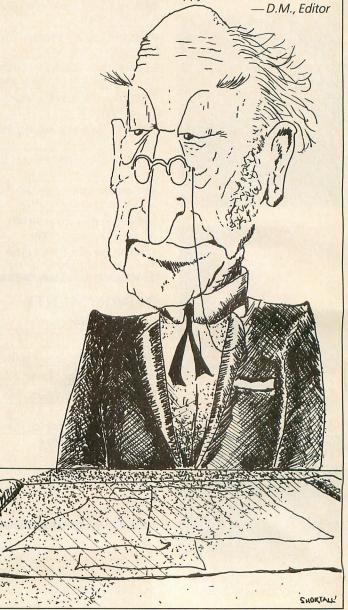
Other projects in the works: GOTO 26 for a neat method to end computer wire confusion; GOTO 96 for a simple explanation of the Boolean functions AND, OR, and NOT. And don't forget our regular features — GOTO 10 (DEFUSR), GOTO 123 (On-Line), GOTO 126 (Reviews), GOTO 140 (New Products) OR you will NOT be on top of the Color Computer world!

A note from the Clear As Mud department: keyboxes are those cute little boxes we place on each article to help our readers determine whether their computer set-up can handle a particular program. If you remember to check them,

you'll never finish typing a long program only to discover it won't run on your machine beause it requires Disk Basic, which you don't have! Since some of our articles contain several programs with different requirements, the keyboxes will now be found on the first page of each program listing; a quick check of the Table of Contents will tell you memory and language requirements for the article, generally.

You'll also find a note referring to the *Tape Loader*; if you haven't seen the ad (or couldn't decide what it means!), the Tape Loader is a cassette tape produced for us each month, to sell to our readers, containing the major program listings from that month's magazine. Since we are not always able to purchase magnetic media rights to all the programs we publish, or becuase some programs are of such limited interest or odd format that they can't easily by put on tape, not all programs in each month's issue will appear on that month's Tape Loader. The Tape Loader banner on program listings, and the Tape Loader notation preceding the memory requirements on the Table of Contents, will tell you which article's listings will be on this month's Tape Loader.

Now, is that clearer? Have a happy summer!



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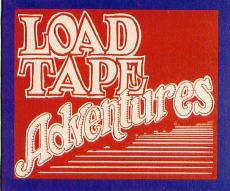
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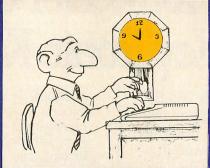
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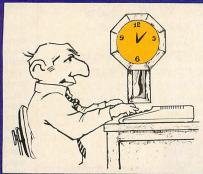
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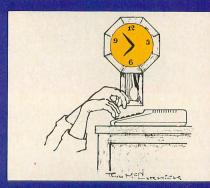












## There are, after all, better ways to spend a day.

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INKEY\$ \_\_ \_

All letters are subject to editing for space considerations.



#### INKEY\$

The Color Computer Magazine Highland Mill Camden, ME 04843 My first original Extended Basic program used all eight graphics pages and more than 16K of RAM. My advice to fellow readers: quit grumbling and upgrade! It's the only way to realize the true potential of your Color Computer.

Ralph Hedenskoog Gahanna, OH

#### Managing Data

Just a few lines to thank Keith Baker for the great data management program for the Color Computer in "File It" (January, 1984).

It proved to be every bit as easy to use as indicated, and to modify, with one exception. I have tried several approaches to inserting a line counter for paginating but have been unsuccessful. Perhaps you could supply this modification in a future issue as others may also appreciate this feature for the program.

W. Rau Elyria, OH

## Questions and Answers

I am writing to ask if I can get listings of the finalist games in your Summer Programming Project and information on the writing of adventure games.

> Ron Midthun Sauk City, WI

No, sorry, we don't own the finalist games. However, we are negotiating to buy many for publication. Keep an eye on future issues. A new series on game programming will be running soon.

— Eds.

#### Adapting the Adaptation

Larry Landwehr's article "Remote Override" (March, 1984) is quite concise, but there is a better and easier way than drilling and installing a toggle switch.

In my General Electric cassette recorder, the remote function also shuts off the rewind and fast forward functions. To get around this I desoldered the wires from the remote jack, spliced and soldered them, put heat shrink over the splice and shrunk it. I then traced a wire back from the Play button. I cut and stripped the wire and soldered the wire(s) onto the remote jack.

This fix enables me to fast forward and rewind the tape; but to play or record, it still needs CLOAD/CSAVE or Motor On/Motor Off commands.

Jim Ayres Philadelphia, PA

#### Converting Cashbook

As a rank amateur at writing programs for my 32K Extended Basic Color Computer, I am always pleased to see good useable programs, and most programs I see are in The Color Computer Magazine. Your 'Cashbook" program (March, 1984), I was distressed to see, is for disk drive systems. Even though I'm not so good at rewriting programs, I undertook the task of converting the **CSAVE and CLOAD routines** for cassette. I would like to share this with other novices that read the magazine (see

I have also put in a routine to exit the program without having to use the Break key:

Listing 1).

160 PRINT" <Q> QUIT PROG-RAM"

210 CLS:ON INSTR ("AVHC&FISDTQ"),M1\$)GOTO10 10,5010,5010,2010,4010,6010, 7010,8010,9010,10010,30000 30000 CLS:END

Charles W. Gordon Ft. Inn, SC

### Grabbing Upgrades

When my subscription began a few months ago, I was disappointed that so many of your program listings were not compatible with my family's 16K Color Basic. Radio Shack just slashed the prices on upgrades, and we were among the first to take advantage of the deal, upgrading to 64K Extended Basic

#### 3000 REM \*load data from tape\* 3010 PRINT"LOADING FILE: ";FS\$ 3020 OPEN"I",#-1,FS\$ 3030 INPUT#-1,FS\$ 3040 INPUT #-1,N\$ 3050 INPUT#-1,C1 3060 INPUT#-1,C2 3070 DIMSA\$(C1),AC\$(C1),T(C1) 3080 IF EOF(-1)THEN3170 3090 FOR L=1TOC1 3100 INPUT#-1,B1\$(L) 3110 INPUT#-1,B2\$(L) 3120 INPUT#-1,B3\$(L) 3130 INPUT#-1,B4(L) 3140 INPUT#-1,AC\$(L) 3150 INPUT#-1,SA\$(L) 3160 NEXTL 3170 GOTO3080 3180 CLOSE#-1:GOTO100 4000 REM \*save data to tape\* 4010 FT\$=FS\$ 4020 PRINT" YOU ARE IN THE \*save\* ROUTINE. PREVIOUS DATA UNDER FILENAME : "FT\$" WILL BE LOST": PRINT" AND RE-PLACED WITH DATA NO W IN MEMORY": PRINT 4030 INPUT" ENTER <S> TO CONTINUE"; T\$:IFT\$<>"S"THEN100 4040 OPEN"0",#-1,FT\$ 4050 PRINT"DATA FILE NAME IS" 4060 PRINTFT\$ 4070 PRINT#-1,FT\$ 4080 PRINT#-1,N\$ 4090 PRINT#-1,C1 4100 PRINT#-1, C2 4110 FOR L=1TOC1 4120 PRINT#-1,B1\$(L) 4130 PRINT#-1,B2\$(L) 4140 PRINT#-1,B3\$(L) 4150 PRINT#-1,B4(L) 4170 PRINT#-1,AC\$(L) 4180 PRINT#-1,SA(L) 4190 NEXTL 4200 CLOSE#-1 4210 IF RIGHT\$(FT\$,1)<>"B"THENINPUT" ENTER <B> FOR A BACKUP COPY ";X\$:IFX\$=B"THENFT\$=LEFT\$(FS\$,LEN(FS\$)-1)+"B":PRINT"BACK-UP ";:GOTO4040 4220 GOTO100

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## INKEY\$

#### **Tricky Maneuvers**

For the keyboard upgrade explained in "Custom Color" (October, 1983), can't you use a Model III or 4 keyboard instead of a Model 1? If the Model III and 4 keyboards have numeric keypads built onto them then isn't there any way to remove them?

David Ham Chicago, IL

Yes, you could, if you can cut the circuit board without cracking it while removing the keypad. Model III and 4 keyboards have a hefty metal shield as well; if you can handle a hacksaw, then you could shorten it, but you'd have a problem mounting this end of the keyboard.

— T. Ed.

#### MC-10 Notes

Thank you, **The Color Computer Magazine** and the authors, Tim McFadden and Doug Kelley of "My MC-10 Speaks ML!," November 1983 issue. I can now save and load machine language programs.

There are three errors in the program listing, however: Line 12 should read GOSUB 1000; Line 110, IF A\$ < 1 OR A\$ > 6 THEN SOUND 1,1:GOTO100 and Line 1040, NEXTC.

For menu selection 2, repeated pressing of W and Z keys could cause an FC error (illegal function call). So, I changed Lines 250 and 260. Line 250 now reads IF A\$="W" THEN A=A+512\*(A>=512). Line 260 reads IF A\$="Z" THEN A=A-512\* (A<=65023). Entry of 65024 will display the contents of location 65535 (at the lower right corner) as a period.

Griff Fryer Sierra Vista, AZ

#### Happy Hexload

I have only had my Color Computer for 13 months and I'm already tiring of Basic. I don't have an assembler so I had to ignore your great assembly listings until you published "One Finger Hexload," (November, 1983). I wasn't sure what it was at first, but I typed it in anyway. I am sure glad I did! I use it every day and it's great for POKEing in machine code. I typed in the assembly program "Slither" in the November, 1983 issue and was very impressed! The sound was fabulous and so was the speed compared to the Basic version.

I promise to subscribe for as long as **The Color Computer Magazine** is around (forever!). Jon Alchin Lompoc, CA

## Fix (03,84)

#### CC Term Fix

In "CC Term" (March, 1984, p. 57), Table 2 omitted the arrow key symbols when describing their function. The table should read (from the top): Up Arrow-\$5E, Shift Up Arrow-\$5F, Down Arrow-\$00, Shift Down Arrow-\$5B, Left Arrow-\$7F, Shift Left Arrow-\$18, Right Arrow-\$09, Shift Right Arrow-\$5D.

#### Spazmorg

"Spazmorg" (March, 1984) has a problem. Line 93 was merged with Line 92. This should not be done since the loop that precedes this line has two exits. One falls out on its own, and the other is a voluntary jump made by the user. Line 93 should read: 93 GOTO 16.

#### **Robot Round Up**

In the December, 1983 issue of **The Color Computer Magazine** the article entitled 'Topo, Armatron, Poorbot, and "Mim" ' was exactly what I was seeking. I would like to get

more information on operating an Armatron by a Color Computer. What can I do?

> Stephen Balkum Arrington, TN

Check the April issue of The
Color Computer Magazine
for two more articles on
Robots — Fds.

## **Bulletin Boards**

#### Syracuse BBS

Color-80 of Syracuse is a new Color Computer bulletin board, on-line 24 hours a day, featuring upload, download, news, sports, merchandise, E-Mail and more. All types of computers are welcome. For more information contact: Kris Olmstead, Sysop, Syracuse, NY or call (315)487-0503 (BBS).

#### Dallas BBS

Careers, a 24-hour BBS, operates out of Dallas, TX using a 64K Color Computer with three disk drives and a 300 baud Hayes Smartmodem. Its theme is career enhancement through education and information. Call (214)692-0513. The board is sponsored by Elkins Institute in Dallas, Inc. and is run privately by John Novocilsky, Jr.

### Clubs

#### CA Club

A Color Computer Club is forming in the Santa Clarita Valley (Newhall / Valencia / Sagus / Canyon Country). For more information, write: SCV Color Computer Club, c/o David Barry, Jr., 23920 Fambrough St., Newhall, CA 91321, or call (805)254-0924.

#### Erie, PA

Erie TRS-80 User's Group meets monthly, has an extensive software library of public domain programs and publishes a club newsletter. To join call (814)456-4786 or write club president Tom Kuklinski, 320 Maryland Ave., Erie, Pennsylvania 16505

#### Northern VA

A new Color Computer Club in Northern Virginia meets monthly in the community room of the Manassas Public Library, Manassas, VA. All Color Computer users, beginners to advanced, are welcome. Regular classes in assembly language and Basic are in progress, and several members are informally meeting as an OS-9 SIG. For more information contact Vice President Allan Weinstein, (703) 361-2293 (in the Manassas area) or Logan McMinn (703) 820-0658 (in the greater Washington, D.C. dialing area).

#### Evansville, IN

For information concerning the Evansville CoCo Club write Brian Broyles, Box 462, Poseyville, IN, 47633 or call (812)874-2210.



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Jake Commander's article, "Dissecting Your ROM," (July, 1983) says it's possible to read Model I tapes into the Color Computer. It sounds interesting and I would like to know how this is done.

- D.K., Macon, GA

I don't have the actual machine code to do the job, but the technique is simple: the Model I tapes store data as discrete pulses placed between timing pulses. Knowing that there are 500 timing pulses coming from the tape every second, all you need do is write a routine to detect the presence of the timing pulse and to check between the pulses for a data pulse. If there's a pulse there, the data bit is a one; if not, it's a zero. Eight pulses together make up one character.

If you want to use this technique to load a Model I program into the Color Computer, you don't have to do the work yourself: Special Projects manufactures "Magic Box," \$27.95, a cassette program which does this for you. It's very simple to use: load the program, plug the provided special cable into the right joystick port, plug the other end into the cassette player, put your Model I tape into the player, and start loading.

I've used it many times, and while it sometimes makes mistakes (putting blanks in strange locations), it's an improvement over typing the programs in by hand. Be sure to check ads for any other programs that may do this, as well.

Has anyone developed a football and basketball game for the Color Computer? I mean a real-to-life type game for each sport, with time clock, field goals, point after attempt, and a variety of offensive and defensive plays?

Also, is Radio Shack planning to produce a new 360-degree, heavy-

duty version of their joystick? I know Kraft makes one, but I'd like one for my Color Computer.

— S.D., Kansas City, MO

At this point I know of no such programs, and I don't know of anyone planning to do it. That doesn't mean it won't happen.

Yes, by now the new, heavy-duty Kraft joystick should be available in Radio Shack stores — stock number 26-3012, \$39.95 each.

Many thanks to R.C. Lake (August, 1983) for a useful Scripsit modification tip. I have two other problems which, I hope, running Scripsit from RAM might solve.

Is it possible, while running Scripsit, to momentarily return to Basic (to change printer font) and go back to Scripsit without losing text?

Can Scripsit be modified to get the program to print French characters (replacing standard keys such as !, @, #, and so forth)? Most of the letters I write are in French, and it makes for a rather unprofessional look to add the accents with a pen after printing.

- M.M., St-Bruno, Canada

That depends on how Basic interacts with the RAM-based Scripsit. If, when you exit Scripsit, Basic doesn't overwrite anything in the text file, you should be able to return to Scripsit with the file intact. The difficulty would be in avoiding the cold-start address to Scripsit, which assumes the text buffer is empty and resets all the pointers to zero. Has anyone solved this problem?

As far as printing French characters is concerned, you have two choices: either write your own keyboard scan routine that intercepts the Scripsit routine before it sends the characters to the text file buffer and replaces the appropriate keys

with the characters you want to use, or write a printer patch to translate those standard characters you can do without into the French characters your printer uses. Adding to Lake's modification to accomplish this shouldn't be too hard. Either way, you'll have to remember which characters on the display go with each new French character on the printer.

I'm looking for a reasonably priced Pascal for my 32K non-disk Color Computer. I know of one company with Pascal for the Color Computer, but would like to compare it to others before buying. Surely other companies besides Computerware write Pascal for the Color Computer.

-J.B., Sturgis, MI

Who can I contact about obtaining a version of Pascal for my Color Computer? Try as I might, I can't find anyone who knows where I can look.

— J.S., Norfolk, VA

There are only two companies marketing Pascal directly for the Color Computer (Computerware, 1472 Encinitas Blvd., Encinitas, CA 92024, 714-436-3512 and Deft Systems, Inc., POB 359, Damascus, MD 20872, 800-368-3238), several companies have Pascal for the OS/9 and Flex operating systems.

If you have the OS/9 disk operating system, contact Computerware (address above), Frank Hogg Laboratory (130 Midtown Plaza, Syracuse, NY 13210, 315-474-7856), Microware Systems Inc. (5835 Grand Avenue, Des Moines, IA 50312, 515-279-8844), and OmegaSoft (P.O. Box 70265, Sunnyvale, CA 94086, 408-733-6979) for prices and specific Pascal abilities.

If you have Flex, contact Computerware, Frank Hogg Laboratory, Omega-Soft, and Technical Systems Consultants (1208 Kent Ave., P.O. Box 2570, West Lafayette, IN 47906, 317-463-2502) for prices and specific Pascal abilities.

Unfortunately, all the current versions of Pascal I know of require a disk system, with 64K RAM preferred (usually required).

If I find any other sources, I'll let you know. And be sure to keep an eye on the ad pages for new additions.

After installing eight 64K Motorola chips on my F-board Color Computer, I'm experiencing some RFI while the TV in the other room is clear, even when switched to computer. Do you know of a solution?

- J.B., San Francisco, CA



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Sounds like the RF shield isn't securely attached to the circuit board. First, visually inspect the metal shield surrounding the SAM and RAM chips to see if it is securely soldered to the circuit board's ground line. The metal cover should fit tightly over the edge of the shield. If it's loose, solder one end of a wire to the cover, the other end to the shield.

Finally, check the RF modulator for good connections to the circuit board. With any loose connections, you could have RFI problems here, especially if the cable to the TV isn't properly grounded to the computer. Similarly, check the modulator box on your TV. I once had severe RFI problems with my computer and couldn't cure the trouble until I replaced the box on the TV (one of the wires to the UHF screws on the TV was worn through and not making good contact).

Do you know any good screen dump programs for the DMP-120 printer? - L.W., Syracuse, IN

The only one I know of is "Screen Print Routine," \$19.95, sold by Tom Mix Software (3424 College N.E., Grand Rapids, MI 49505, 616-364-4791). It will send whatever is on your video to an Epson,

Microline, or Radio Shack DMP printer. Positive and reverse formats are available, as are horizontal, vertical, small, large, left, right, and center of page layouts. As always, keep an eye on ads for other sources.

My Color Computer won't save any programs to tape and I don't have disk drives. I do know that: the large black plug works; the small grey plug works; the hole that the large grey plug goes into works, because the recorder records with the mike plugged in; and the recorder starts when I type CSAVE. I think either the computer isn't working or the output isn't getting through the cord. Please help!

-B.H., Franklin, PA

Before blaming the computer, make sure you're doing everything right. If you aren't using a CCR-81, borrow one. Put the black plug into the cassette EAR jack. Put the small grey plug into the REM jack. Put the large grey plug into the AUX jack.

Now type in a short program and put a blank tape in the recorder. Press the record and play buttons down at the same time. Type CSAVE. When the recorder stops, unplug all plugs and rewind the tape. Now press the play button. You should hear the program as it was stored on the tape (make sure the volume is set at five). If you do hear the program, put the plugs back in, rewind the tape, and try to CLOAD the program. Keep playing with the volume until the program loads.

If you didn't hear anything on the tape, repeat these steps with a different tape recorder; yours could be bad. If neither tape recorders record, the problem could be either your computer or the cassette cords. Radio Shack sells new cords (26-1207, \$5.95). Buy a new one, or borrow one from a friend, and repeat the above procedures. If you still can't hear anything on the tape recorders, the problem is definitely with your computer; take it in for repairs.

With a monitor is it possible to have a 64 by 24 screen without wraparound?

-C.M., Cut Off, LA

Yes, but you won't be able to read the characters. The Motorola VDG chip determines video resolution, which is limited to 256 dots across the screen and

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192 dots down. Each character is composed of a box of these dots. In standard Radio Shack format of 32 by 16, each box is eight dots wide and 12 dots high. Three dots of width and five dots of height separate characters, leaving five by seven dot characters.

With 64 characters across the screen and 24 lines down, the box is four dots wide and eight dots high. Using one dot to separate them leaves characters three dots wide and seven high. While the height is enough for defining a character, the width is insufficient for legibility.

If you can make do with a screen size of 42 by 24, there's a hardware box that delivers this without eating up any of your computer's RAM. Computer Systems Distributors (P.O. Box 9769, Anaheim, CA 92802, 714-772-1390) sells ColorMate, an expansion box that plugs into the ROMpak port, for \$495. It has another ROMpak port built in so you can still use your other ROMpaks without unplugging ColorMate.

I recently purchased a spooler program for my 64K Color Computer (I upgraded it myself). The instructions for a 64K computer say to type EXEC 3589, then says "WARNING! If you

have 64K and you are running your Basic in RAM, ... if you type EXEC 3569, your Basic will crash." Does this apply to me?

-P.C., Pasadena, CA

Some people copy the ROM into low RAM, switch the upper 32K bank of RAM in place of the ROM, then copy the ROM from low RAM to high RAM. This gives them the chance to play with and modify Basic and to put data or programs in the highest 16K RAM bank above the ROM, which is usually reserved for ROMpaks.

Since you aren't doing this, the warning doesn't apply to you. For a list of some programs that will let you do this, see the June, 1983 DEFUSR column.

The Radio Shack catalog lists a new Color Computer keyboard. How does it compare with other keyboards mentioned in your magazine? Also, are there any incompatibility problems in connecting a Color 2 disk to an old "grey" Color Computer?

Sears' catalog lists an interface box and connector cable for their Communicator 3 electronic typewriter, which interfaces to Model I and III computers. Can I hook one up to my Color Computer? My wife and daughter want a new typewriter and I'd like a letter quality printer.

— D.B., Albany, OR

Radio Shack's replacement keyboard is the same used on their new Color Computer 2, — not a full-travel standard keyboard, but an improvement over the previous chiclet keyboard. Some people don't like the feel of the new keyboard, preferring standard keyboards advertised in our magazine. The advantage of the Radio Shack keyboard is price. I advise you to go to your local Radio Shack and play with the Color Computer 2 keyboard for awhile and see if you like the way it operates. If you don't, then get one of the standard keyboards.

The new Color 2 disk ROMpak is totally incompatible with the old Color Computer even though the drives may be switched (they're identical except for the exterior cosmetics).

The Sears interface works with parallel port computers and can't be used with the Color Computer unless you buy a serial-to-parallel printer converter box, which increases the price by \$70 to \$80.

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D.S., Kentucky

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M.S., California

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H.G., Virginia

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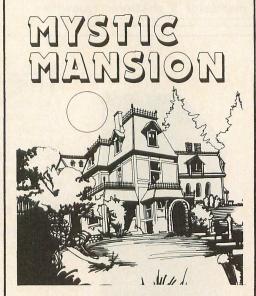
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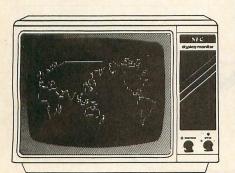
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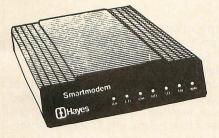
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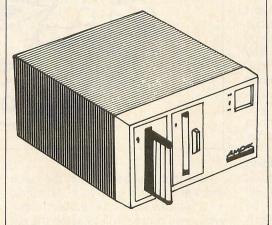
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# GOTO SCHOOL

by Dr. Paul Kimmelman

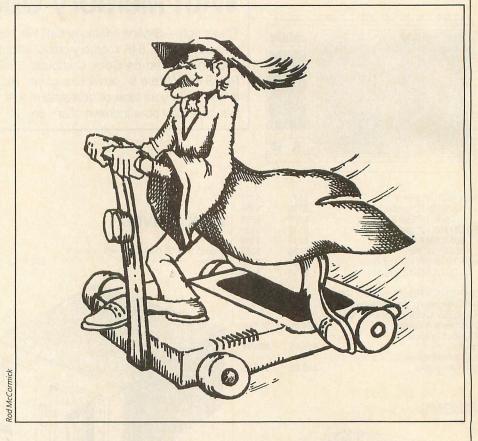
S SPRING WEATHER BEGINS to arrive and the year-end school bells start to ring, thoughts of summer vacation emerge. Students are happy with no more homework, and parents feel frustrated, wondering how the young ones should be entertained over the summer. One source for summer escape is the increasingly popular "computer camp."

The computer camp comes in all different shapes and sizes. Some are homes away from home, others day-long adventures, and some just a few short hours of respite from the often tedious summer boredom. You can find camps run by entrepreneurs (who may or may not be looking for a "fast buck"), colleges and universities with well-planned programs, computer enthusiasts wanting to share their excitement, and yes, even Radio Shack with its well-planned and successful computer workshop for Color Computer users.

Where should you send your budding computer enthusiast? What features should you look for? How much should you spend? These questions must be considered carefully when deciding if computer camp is for your child.

The newspapers and magazines are full of ads claiming their camp will perform wonders for your child. Remember the basketball camp that would make your ten-year-old a Larry Bird? Enough for unfounded claims. A computer camp should help fulfill your child's needs and interests.

Step one should be a visit to the camp and a talk with the director or instructor. Whether the camp costs \$50 or \$500, it is going to be responsible for your most precious possession, your child. Sending your child to a poorly run camp will be a horrible experience and will more than likely destroy any interest your child had in computers, not to mention his or her computing potential.



Now that you have visited the camp and see that it meets your standards, what features are most important? Obviously, your budget will establish the parameters: camp costs vary depending on their type. You can send your child to a camp far away from home which will provide not only computer training but those evil moonlight camp stories, as well. If this type of camping experience interests you, then add costs for transportation, food, and lodging.

For those on a limited budget, opportunities should abound in your own town or city. If you are fortunate enough to live near a university or college, rest assured that summer computer opportunities for children exist. I tend to favor the university setting because it offers your child exposure to the world of higher education, and we all tend to hope our children will end up there, right? Usually the college program is run by enthusiastic col-

lege students earning their future tuition, along with their professors.

Some local camps have also emerged. Like the college camps they can be well-run and designed to meet the needs of your child. A big caution flag is raised here, however. The word computer carries a magical mystique for parents who believe it to be an educational panacea for their child. There are camps that play on the needs of parents who are willing to spend hard-earned cash to provide oppportunities for their children that local schools haven't met. To be certain, visit the camp, talk to the teachers, and ask to see the curriculum — not a bad practice for any of the camps.

Finally, there is our trusted old standby, Radio Shack. Not one to be outdone, the Tandy people have developed their own version of a computer camp.

We'll explore the Radio Shack Computer Camp curriculum later, but for

now let's continue to look at camp features that are very important. Now that we have talked to the director and visited the camp, what's next?

#### A Camp For Who?

Is the camp really for your child, or are you forcing the experience on him? Don't! How does your child feel about going to camp? Does he show interest in programming activities a la Logo, or does he seem to prefer computer-assist-

ed instructional programs?

Is the length of the camp program suitable? Don't expect your ten-year old to sit for a day with no diversion activities. Some camps offer swimming or recreational activities for the young camper. If the camp lasts for more than three hours, for example, your child will need a pause. Some of the recreational activities may include computer games. Don't be afraid of games — a good blend of computer experiences can make the day more fun and keep your child enthused. Who said learning shouldn't be fun, anyway?

Bear in mind that recreational activities should be used for camps of longer duration. A camp that lasts for only a couple of hours daily should get straight to the lesson and remain "on task" full time, but for all-day camps, swimming or vol-

levball is a pleasant relief.

Now look at staffing. One qualified teacher will be able to work well with a small group, but not with a group of, say, 50. While there is no perfect studentteacher ratio, I suggest a range of one staff member to every 10 or 15 students. Excited children don't like to wait very long for answers to their questions, or for teacher to see their newly created proiects.

In many instances there will be a teacher who has assistants to help the students. No problem, but be sure there are enough qualified supervisors for the number of students enrolled. Be sure to ask how many children can be enrolled? Don't stand for "padding" the enrollment unless proper arrangements are made, like more computers, more staff, and more room.

A computer camp should, obviously, have enough computers. Everyone has their own opinion concerning how many computers there should be per student. I suggest no more than two children per computer. In fact, I prefer two per computer because it allows children to share their thoughts as well as their excitement. Doesn't one student per computer seem somewhat lonely?

I also believe that every child should have an opportunity to spend some individual time at the computer. Every student needs some individual time to review the lessons and do some homework. This type of time can be scheduled before camp begins, during breaks, and after camp ends each day.

When looking at the curriculum, check to see if it is common to your child's needs. A Logo camp has everyone working on Logo, for example. I would be leery of a camp that enrolls 25 students and teaches Logo, Basic and Pascal. Those languages span a variety of ability levels, and too much is being done for one group. Look for camps that meet a com-

Chances are you use the Color Computer, so try to find a camp that has at the least some Color Computers. It isn't essential to have Color Computers, but children find security in a familiar environment. Putting your little Color Computer user on an IBM may be a little frightening. Don't be afraid to ask if Color Computers are available. Some camps use a variety of brands.

Finally, what curriculum material will be available at the conclusion of the camps? Is there a textbook? Will instruction sheets be given to the camper during camp? After camp you will want your child to be able to apply the material that was learned. Does the instructor provide suggestions for future use of the camp curriculum? Will a future camp be available for those campers who want advanced lessons? Camp won't be useful if all it does is babysit for your child.

Now that we have looked at the different types of camps and explored some important features, let's find out what a Radio Shack Camp will teach your young-

#### **Radio Shack Camp**

The Radio Shack computer camp program was developed by the Radio Shack Computer Training Programs department. What is the most significant advantage of the Radio Shack camp? Your child will be working on the Color Computer, taught by Color Computer-trained instructors, and working with a wellwritten Color Computer curriculum. Radio Shack Computer Centers offer their computer camp programs for children at convenient times, during school breaks and summer, for example.

Each instructor works from a comprehensive manual which is accompanied by overhead projections. Using overhead

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projections is particularly important, because it includes visual presentations along with the lecture. Not every student learns best by hearing the lesson, so being able to see what is going on is good teaching strategy. Students also spend plenty of time working on the computer, doing hands-on activities so the blending of activities is very good. What the manual can't do is teach, so once again be sure to meet the teacher before enrolling.

Each camper is given a manual which he can keep when camp is over: no more excuses for not showing mom and dad how to play music or change colors with

the Color Computer!

There are two different camps offered by Radio Shack for their Color Computer enthusiast. Both camps were designed for beginners, and particularly for students from 12 - 15 years of age. One camp is specifically for Logo instruction; the other for beginning Color Computer operators. The operator's class also includes a unit on Logo. Each camp lasts two hours per day for five days.

The philosophy of the Color Computer Operators Camp is to provide students who have little or no previous computer experience with a background of computer history, operational skills, and an introduction to Basic and Logo. Your child won't leave the camp an expert, but perhaps he will be enthusiastic enough to pursue the hobby. Maybe he will even write programs whose sales will help

support you forever!

Enough dreaming. Let's get back to the operator's class. The camp opens with Radio Shack's software package, "Pioneers in Technology." This presentation gives each camper some background on the history of computers (why do we even need or use computers in our society?).

Following the history of computers, Basic programming is taught. The objectives of the lesson are to explain the meaning of the term Basic, sounds, writing programs that ask questions, counting programs, editing, and changing screen colors.

#### **Camp Secrets**

While not divulging camp secrets, can you program your Color Computer to make all the possible sounds? One hint: start at 1. Once you reach the highest note can you bring it back to 1? Get creative — now skip a note or two.

Maybe you aren't an executive secretary and your typing skills leave a little to be desired. What happens when you make a mistake? If you can edit, the problem can be eliminated. Perhaps whole lines need to be eliminated. Campers will learn preliminary editing tech-

Learning about PCLEAR, PCLS, PMODE, Screen, Color Sets, Line, Circle, and Paint are all part of the graphics lesson. Be careful: what you learn at camp may not work at home if your computer doesn't have Extended Basic. Some subroutines, string packing, and animation are also offered during the graphics lesson.

#### Logo, Too

Now that you know how to make a circle, paint a letter, and get some extra memory for those fancy graphics, what's next? You guessed it: Logo. You thought your child was ready to conquer the computer world, and now they start a whole new unit with another computer lan-

quage.

Logo is an important addition for the Color Computer arsenal. If there was any software that firmly established the Color Computer for educational use, Logo was it. The Logo camp lessons will teach your child about the four modes in Logo, and how to enter and run a Logo procedure. Programming opportunities in Logo are really unlimited, and creativity can produce some exciting programs. If your child's interest is captured, there is a camp devoted to Logo instruction

As noted earlier, the Radio Shack camps are for the novice Color Computer user. Computer Center Manager Bill Farkas (Fairlawn, Ohio) offers some final thoughts for parents of campers: "Try to be supportive of your child's interests." Computers play an important role in our society and children are literally growing up with them.

Farkas also suggests that parents look at some of the books offered by Radio Shack, particularly the Parents Guide To Logo. "Family computing can be a healthy and happy activity," according to Farkas.

Summer really doesn't have to be a long, boring break from school. In fact, it can be a continuation of some pretty exciting learning opportunities. Computer camps can offer those experiences. They can run for several hours to several weeks and cost from \$50 to \$500. They can train beginners to experts. Who knows, maybe camp experiences will find your child publishing some very special Color Computer programs.

Happy camping!

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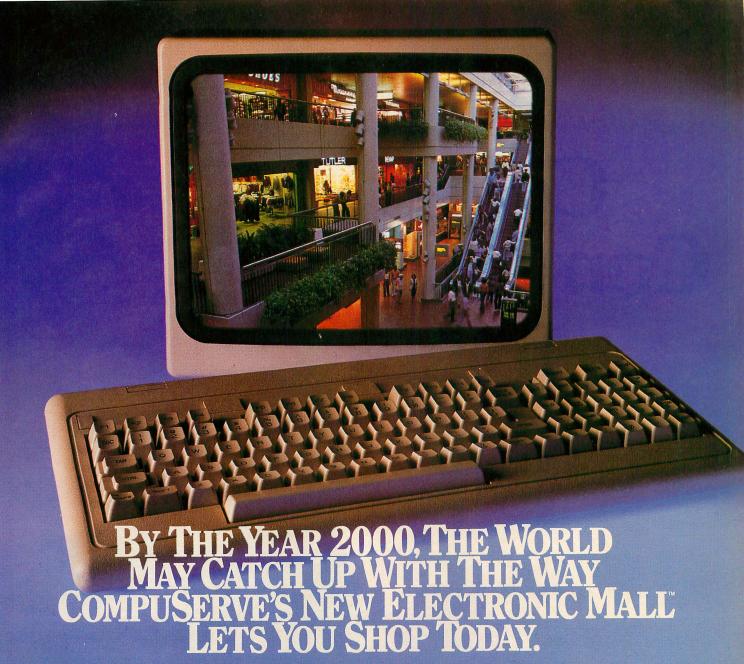
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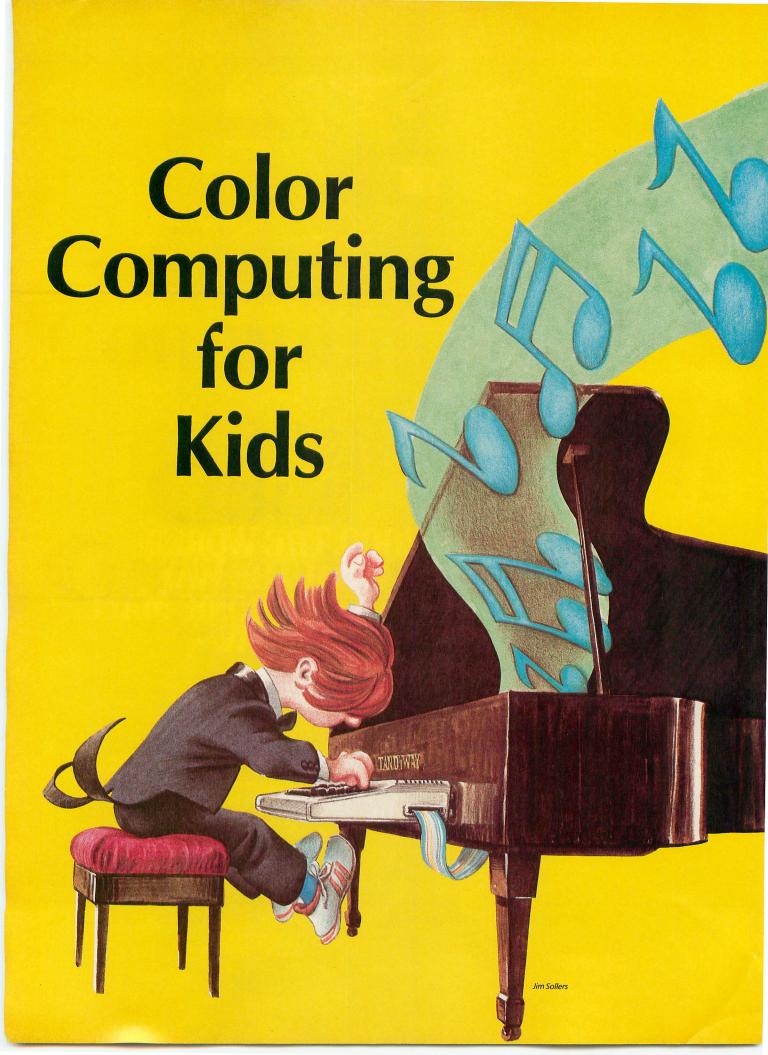
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# INKEY\$, a Father's Day gift, and playing your computer like a piano!

by Jean Plesser

AST MONTH WE SURPRISED and delighted some special Moms with electronic greeting cards. This month it's Dad's turn (Father's Day is June 17), and we have a great surprise for him! No, not another greeting card — you can now do that on your own. We're going to challenge Dad with a keyboard match-up game!

to challenge Dad with a keyboard match-up game!
Is Dad an "expert," "so-so," or a "beginning" typist? How about you?
"Keyboard Match-up" offers three skill levels and everyone can work up to expert with practice. It's a fun game the whole family can enjoy, so after you wrap it up for Dad's day, line up and try your own reflexes and knowledge of the keyboard. Bet your typing will get better!

knowledge of the keyboard. Bet your typing will get better!
Before we get to "Keyboard Match-up" we have a few things to learn.
This month we're going to play with INKEY\$.

INKEY\$ (say "Inkey string") is a Color Basic command that tells your computer to check the keyboard and to store as a variable whatever key is pressed. The variable is always a string variable, so the data is always string data. The format is: 10 I\$=INKEY\$. (The variable's letter can be any that you choose.)

In a program, the INKEY\$ command line is read only one time (the computer does not wait for you to respond like it does with an INPUT statement). If you had not pressed a key when the computer read the INKEY\$ line, the variable would simply contain no character at all ("") and the computer would look for more instructions. Use this line to tell the computer that you want something other than nothing.

20 IF I\$="" GOTO 10

Now the computer will keep going back to Line 10 until you press a key. The INKEY\$ statement does not print anything on the screen (INPUT prints a question mark), so you must always add a PRINT statement to let the *user* know what to do. The user is whoever is using your program — it may not always be you!

#### **INKEY\$ vs INPUT**

I've mentioned two differences between the INKEY\$ and INPUT statements:

INKEY\$ does not wait for a response from the keyboard before going on to the next statement. INPUT waits for you to press the Enter key.

• INKEY\$ does not print anything on the screen. A separate PRINT statement must be used. INPUT prints a question mark on the screen, and a PRINT message can be included in the statement.

Let's use two short programs to demonstrate these differences, first as an INPUT program, then an INKEY\$ program.

10 CLS

20 PRINT65, "PRESS A KEY THEN PRESS <ENTER> "

30 INPUT K\$

40 PRINT:PRINT"YOU PRESSED- - >";K\$

50 GOTO 20

You must press the Break key to stop this program and the one that follows; they each enter an endless loop. When you have seen the above program run long enough to remember it, type NEW and enter this program:

10 CLS 20 PRINT@65,"PRESS A KEY" 30 K\$=INKEY\$
40 IF K\$=" "GOTO 30
50 PRINT:PRINT"YOU PRESSED - - >"K\$
60 GOTO 20

I think you'll agree that the INKEY\$ program was faster and more efficient, and it may have seemed like more fun because the computer response was immediate.

## To INKEY\$ Or Not To INKEY\$

There are two other important differences between INKEY\$ and INPUT that will help you determine which statement to use:

- An INKEY\$ variable will hold only one character at a time, while an INPUT variable will hold up to 255 characters. When you ran the test programs you became aware of this: the INKEY\$ program responded as soon as you pressed a key, but the INPUT program waited until you pressed Enter. If you use INKEY\$ and want to collect keyboard responses, they can be added together in one variable (TK\$ = TK\$ + K\$), but we will not be doing that in this lesson.
- The other difference is that INKEY\$ responses are stored only as string data. This means that numbers would not have a numeric value. But there is a way in Basic to find the value of a number stored as a string. The function is: V = VAL(K\$). This statement tells the computer that V is to equal the VALue of K\$. The next program will put the Value function to work.

#### **INKEY-A-Tune**

Program Listing 1 will turn the numbered keys on your computer's keyboard into a piano keyboard. The results may be quite different from a baby grand piano, but remember you're not playing a baby grand. You're playing a computer, and as computers go, ours sounds pretty terrific!

I think you'll have fun with "Inkey-A-Tune" as well as learn a few programming tricks. Here's a line-by-line explanation:

Line 10 is a Remark statement that names my program.

Line 20 clears the screen and prints the title at screen location 43.

Lines 30 – 50 print the numbers to press and the notes they will play. This is a user message that helps the user understand the program.

Line 60 prints a message that tells the user that the notes played will be printed on the screen.

Line 70 will print a space at screen location 352, and the semicolon tells the computer to stay on the same line to print whatever follows. This is a way of printing all the notes that are played right across the screen, starting at location 353. The printing is done later in a loop.

Line 80 assigns whatever key is pressed (INKEY\$) to the variable M\$. A second statement on the same line keeps the computer here until a key has been pressed and M\$ equals a character.

Line 90 is an example of the Value function we talked about. We are using the numbers on the keyboard for a purpose, and their number value is important to the program. For example, if M\$ = "5" the 5 is only a character to the computer — it has no numeric value: it is string data. The Value command gives the number in a string variable a numeric value, and a numeric variable will then hold the value N = 5.

Line 95 is a test statement using the operators < (less than) and > (greater than). Because we are using only eight notes, numbered from one to eight, a keyboard response that is out of this range is an error. The test statement simply sets N to one whenever an error occurs. If this line were omitted from the program, and N were to contain a larger number, we would get an OD ERROR message. This is the computer's way of telling us we ran out of data — we only have eight sets of data to read.

Line 100 begins a For/Next loop that will repeat whatever number of times N equals. This loop will read data until L = N. The data found at that point is then used by the program.

Line 110 sends the computer to the data statements to read one piece of string data (N\$) and one piece of numeric data (T). The second statement on this line tells the computer to go back to Line 100 until L = N.

Line 120 prints the contents of N\$ on the screen at the location designated. Remember the semicolon (;)? Continued use of the semicolon prints the notes on one continuous line. The next statement on this line is the SOUND command, and the contents of T are being used for the *tone* portion of this command. The number five is used for the *duration* (length) of the sound, or note.

Line 130 resets the data pointer to the beginning of the data statements. The program then returns to Line 80 and begins again. If we didn't use the command RESTORE, we would get another OD ERROR message when the program repeated and ran out of data to read.

"Inkey-A-Tune" will continue running until you press the Break key. You can

play simple tunes, and if you make up one that you like, you can play it again because the notes you have played are printed on the screen for you.

#### **Keyboard Match-Up**

Program Listing 2 is a keyboard skill game that will make a great Father's Day gift for the special Dad in your life. "Keyboard Match-up" is fun, requires skill, and teaches letter placement.

As always, you may want to get help typing it in or do your typing in short session, the CLOAD what you've saved when you're ready to type some more, CSAVE that session's work, and so on. work, and so on.

I've added a few new routines to this program so I'll first list the variables, then explain "Keyboard Match-up."

The variables:

**I\$** = INKEY\$ (keyboard response).

**S** = the skill level time allowed.

**R** = a random number used to control a loop that reads data.

**L\$** = the letter attained by the "random number read loop."

**TM** = the total number of matches, or games.

T =the time allowed in each skill level.

**TC** = the total number of correct matches made.

Lines 20 through 80 print a *menu* on the screen. A menu is used to tell the user what the program offers and give a selection. In this case the user will select a skill level. The skill level is selected by pressing 1, 2, or 3; all other keys are ignored.

Lines 90 through 100 examine the contents of I\$, assign skill values to S and GOTO to the appropriate routine.

Lines 110 through 130 simply keep the game from starting until the user is ready to play. The user indicates he's ready by pressing any key.

Lines 140 through 180 print out the game screen.

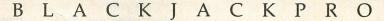
Line 200 selects a random number for the variable R, that will be no greater than 26

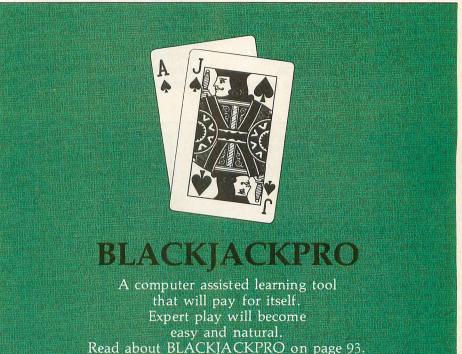
Line 210 uses the value of R to read "R" number of data statements. This results in a random letter (L\$) that will be used in the game.

Line 230 adds one to the total match counter and makes T equal to the value of S.

Line 240 prints the random letter that the user must match.

Lines 250 through 290 create a sound and a time countdown until a key is pressed or time runs out.





SKILLWARE

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Line 300 prints the contents of K\$.

Line 310 examines L\$ for a correct match.

Line 330 is an incorrect match routine. Lines 350 and 360 are for an "out of time" routine.

Line 380 is a correct routine and the total correct counter is added to.

Lines 390 through 460 are executed

after any one of the above routines. Totals are printed on the screen and a replay routine using INKEY\$ is done.

Lines 470 through 490 are the data the letters of the alphabet that are randomly selected.

Summer is the time to live it up a little, and the INKEY\$ command can liven up your old programs. Also, use these ideas to create new and fun programs on some of your quiet, lazy summer afternoons.

We're going to take a break from programming next month and talk about software — how it's made and why we should protect it from modern-day pirates! See you then and have a happy last day of school!

# TAPE

### Program Listing 1. A Piano Keyboard



**4K Color Basic** 

10 REM--INKEY A TUNE--

20 CLS: PRINT@43, "KEYBOARD FUN"

30 PRINT@98, "THE NUMBERS TO PRES

S FOR EACH NOTE ARE: " 40 PRINT@196, "1=C 3=E2=D4=F "

50 PRINT@260, "5=G 7 = B6 = A

60 PRINT@320, "THE NOTES YOU HAVE PLAYED ARE:

70 PRINT@352,;

80 M\$=INKEY\$:IF M\$="" THEN 80

90 N=VAL(M\$)

95 IF N<1 THEN N=1 ELSE IF N>8 T HEN N=1

100 FOR L=1 TO N

110 READ N\$,T: NEXT L

120 PRINT NS;: SOUND T,5

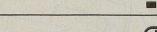
130 RESTORE: GOTO 80

140 DATA C,89,D,108,E,125,F,133

150 DATAG, 147, A, 159, B, 170, C, 176

Program Listing 2.

Keyboard Match-Up





4K Color Basic

10 REM---KEYBOARD MATCH-UP---

20 REM--SKILL MENU--

30 CLS:PRINT@37, \*\*KEYBOARD MATCH GAME\*\*

40 PRINT@106, "SKILL LEVELS:"

50 PRINT@171,"1 = EXPERT"
60 PRINT@235,"2 = SO-SO"

70 PRINT@299, "3 = BEGINNER"

80 PRINT@417, "SELECT A NUMBER--"

90 I\$=INKEY\$: IF I\$="" THEN 80 100 IFI\$="1"THEN S=10 ELSE IFI\$=

"2" THEN S=15 ELSE IF I\$="3" THE

N S=30 ELSE 80

110 CLS: REM--GET READY--

120 PRINT@229, "PRESS ANY KEY TO BEGIN"

130 I\$=INKEY\$: IF I\$="" THEN120

140 REM--GAME SCREEN--

150 CLS:PRINT@65, "THE LETTER TO MATCH BEFORE THE"

160 PRINT@131, "TIME RUNS OUT IS--->"

170 PRINT@204, "TIME = "

180 PRINT@262, "YOUR RESPONSE--->

190 REM---SET-UP VALUES--

200 R = RND(26)

210 FOR X=1 TO R:READ L\$:NEXT X

220 REM--GAME ROUTINE--

230 TM=TM+1: T=S

240 PRINT@152,L\$

250 I\$=INKEY\$

260 SOUND1,1: T=T-1

270 PRINT@211,T

280 IF T=0 THEN 340

290 IFI\$="" THEN 250

300 PRINT@280, I\$

310 IF I\$=L\$ THEN 370

320 REM---INCORRECT ROUTINE-

330 SOUND100,5: GOTO 390

340 REM--OUT OF TIME ROUTINE--

350 SOUND 50,10: PRINT@262, \*\*\*\*\*

OUT OF TIME\*\*\*

360 GOTO 390

370 REM---CORRECT ROUTINE---

380 SOUND 200,5: TC=TC+1

390 REM--TOTALS--

400 PRINT@352, "CORRECT MATCHES =

410 PRINT@384, "TOTAL MATCHES ="; TM

420 REM---REPLAY ROUTINE--

430 PRINT@448, "PLAY AGAIN (Y/N)?

440 I\$=INKEY\$:IF I\$="" THEN 440

450 IF I\$="Y"THEN 460 ELSE IF I\$

="N" THEN END ELSE 440

460 RESTORE: GOTO 150

470 DATA A,B,C,D,E,F,G,H,I,J,K

480 DATA L, M, N, O, P, Q, R, S, T, U, V

490 DATA W, X, Y, Z

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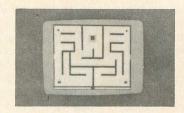
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# Internal Modem

Reducing wire confusion

S MY COLOR COMPUTER system grew over the years, I began to realize that I was spending more time being a "boy scout" than I spent programming. After staring at my hopeless tangle of cables, I decided to remove a little clutter. The fact that Radio Shack's videotext machine has a built-in modem, and yet uses the Color Computer case, inspired me to install my modem inside my machine.

After opening my Radio Shack Modem I, I discovered that the circuit board inside is smaller than the case and reasonably flat. A quick measurement of the board revealed that it would fit over the RFI shield inside the computer, with some modifications to the board and the computer case.

If you attempt the following modification you will have to modify the modem and soldering experience is a must. Experience with switches and LEDs is also helpful, but is not absolutely necessary. This modification will also void the warranty on the modem and the computer.

#### Method

First remove the four screws located on the bottom of the modem. Remove the top cover and you will see the circuit board inside. There are four more screws on the circuit board, attaching it to the bottom half of the case. These must be removed as well. The circuit board should now be free and you may remove it from the case.

To control the modem, the answer/ originate and power toggle switch must be removed. If you are sure this will be a permanent modification, you may take a small pair of wire cutters and carefully cut each terminal of the toggle switch. by M.K. Marston

Try to cut each post as close to the switch case as possible. This becomes a place to solder future wires. If you think you may decide to return the modem to its original state, you will have to remove the switch by carefully heating each terminal, and remove the solder with solder wick or a similar product. Gently break each terminal loose with a small screwdriver and remove the switch. Using a pair of wire cutters, cut each pin of the LEDs on the modem board as close to the base of the LED as possible, leaving as much as possible of the pin on the board (again, for a place to solder the new wires).

You will need two DPDT micro-miniature toggle switches to replace the one you have just removed. Solder a four-

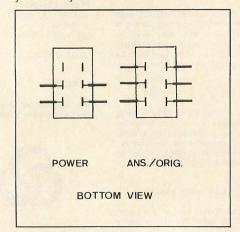


Figure 1. Switch Terminals

teen-inch piece of wire to each terminal on one of the switches. Solder a fourteen-inch piece of wire to all but the top two terminals on the other switch (see Figure 1).

You will also need two LEDs (any of Radio Shack's will work fine). Solder a sixteen-inch piece of wire to each pin on the LED. Be sure to insulate each pin on the LED with electrical tape to prevent shorting.

On the modem circuit board you may either solder four eight-inch pieces of wire to the back of the RS-232 jack, or you may remove the jack, as described with the toggle switch above, and solder the wires directly to the board. If you solder the wires to the back of the jack, add a little solder to each terminal first and then tin each wire. This will ease soldering

Some modifications to the computer case must now be made. First remove the six screws on the bottom of the computer. The top of the case should be free. Four holes are needed to accommodate the two switches and the two LEDs: the area to the right of the logo, just above the keyboard, is a good place. Drill two holes, four inches from the right side of the case and 1/8 inches up from the black area surrounding the keyboard. The holes should be side by side, about an inch apart. The two DPDT switches will be mounted here. Just above each switch, on the curve in the case, drill two more holes. These are for the two LEDs (see Figure 2). After drilling the holes, mount the switches and LEDs. The switch with the two empty top terminals goes in the left hole.

The plastic post in the middle of the RFI shield must be cut at the shoulder (Figure 3) so the modem circuit board may rest on it. After trimming the post, place a piece of double-sided foam tape on the top of the post to prevent any remaining sharp edges from damaging the underside of the circuit board.

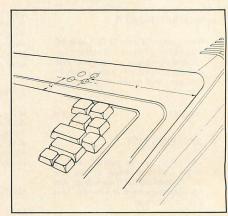


Figure 2. Hole locations for Switches and LEDs.



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The game of **COLOR DISK TRIVIA** can be played by from 1 to 4 people (or teams), and you set the length of the game at the start when you decide how many questions must be answered in each category to win. The computer chooses the categories randomly, though sometimes it will let you choose the category for yourself (or let your opponents choose for you). Because of this category selection by the computer, a single category can often hold you up while one of your opponents slips by to win. The outcome is always in doubt, and no player is ever eliminated.

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TECHNICAL INFORMATION: COLOR DISK TRIVIA is a mixture of Machine Language and BASIC. It uses Fielded Direct Access Disk Files. COLOR DISK TRIVIA requires 16K and at least one disk drive.

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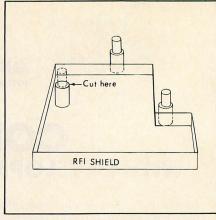


Figure 3. RFI Shield Post

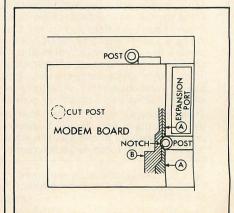
"Test fit" the circuit board by placing it in the computer, over the RFI shield. The back of the circuit board should be even with the back of the plastic frame surrounding the expansion port. There is a small shelf on the frame. This makes a good resting spot for the circuit board, and provides a place to secure it.

On the edge of the board, there is a screw hole. Mark the spot where the hole sits over the shelf. Make a small hole in the shelf at that spot. This will let you use one of the original screws to attach the board at that point. Insert the screw through the circuit board and partially tighten it in the hole on the plastic shelf. The circuit board should be loose enough to move.

Note where the right edge of the circuit board comes in contact with the plastic post at the right side of the RFI shield. Carefully cut a small notch in the circuit board at that point, to allow the board to sit squarely. Take extreme care not to damage any traces in that area (see Figure 4).

Now tighten the screw completely and press the circuit board down onto the foam tape that is covering the plastic post. Your modem is now mounted and ready to be hooked up.

Figure 4. Circuit Board Notch Location



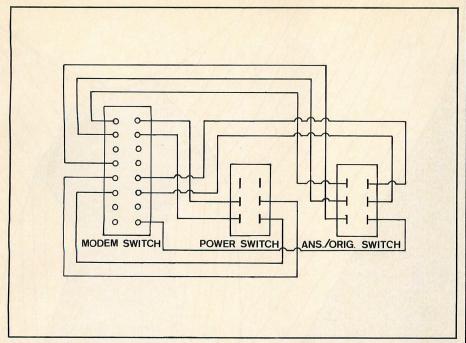


Figure 5. Switch to Modem Hook-up

#### **Hooking Up**

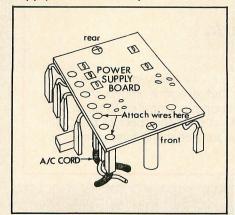
The four wires connecting the RS-232 will be connected first. Prepare the RS-232 jack in the computer in the same manner described above (adding solder to each terminal). The rightmost wire on the jack in the modem goes to the leftmost terminal on the jack in the computer. The wire second from the right in the modem goes to the terminal second from the left in the computer, and so on.

Place the case containing the switches and LEDs next to the computer so the wires will reach the modem board. Solder the wires from the LED on the left of the computer case to the two pins from the original LED on the modem. Be sure to observe that the polarity of the LED in the computer case matches the polarity printed next to the LED pins on the modem board. Information concerning the polarity of the LEDs you have installed in the computer case should be included on the package. No damage will result if they are installed backwards; they simply won't work, and you will have to reverse the leads. Be sure to insulate the connections on the modem board with electrical tape to prevent shorting. Refer to Figure 5 to hook up the switches to the modem board.

Now you need only connect the modem to the telephone lines and power source. The transformer is small enough to fit inside the computer next to the power supply. Solder an eight-inch piece of wire to each prong on the transformer and insulate with electrical tape. Solder

the other ends to the power supply board, as shown in Figure 6. Using electrical tape, secure the transformer to the black metal "fingers" of the heatsink next to the power supply. Coil up the excess cable and tape it, leaving enough cable to reach the power jack on the modem board. If you prefer, the transformer may be left external and the power cable may be run into the computer case through a small notch cut into the back of the case. Obtain a modular telephone extension cord and plug one end into the telephone jack on the modem board. Make a small notch in the back of the computer case and run the extension out the back of the case. Mark this cable "to telephone jack." Run the phone cable. already attached to the modem, through the notch as well. Mark this cable "to telephone."

Figure 6. Transformer to Power Supply Board Hook-up



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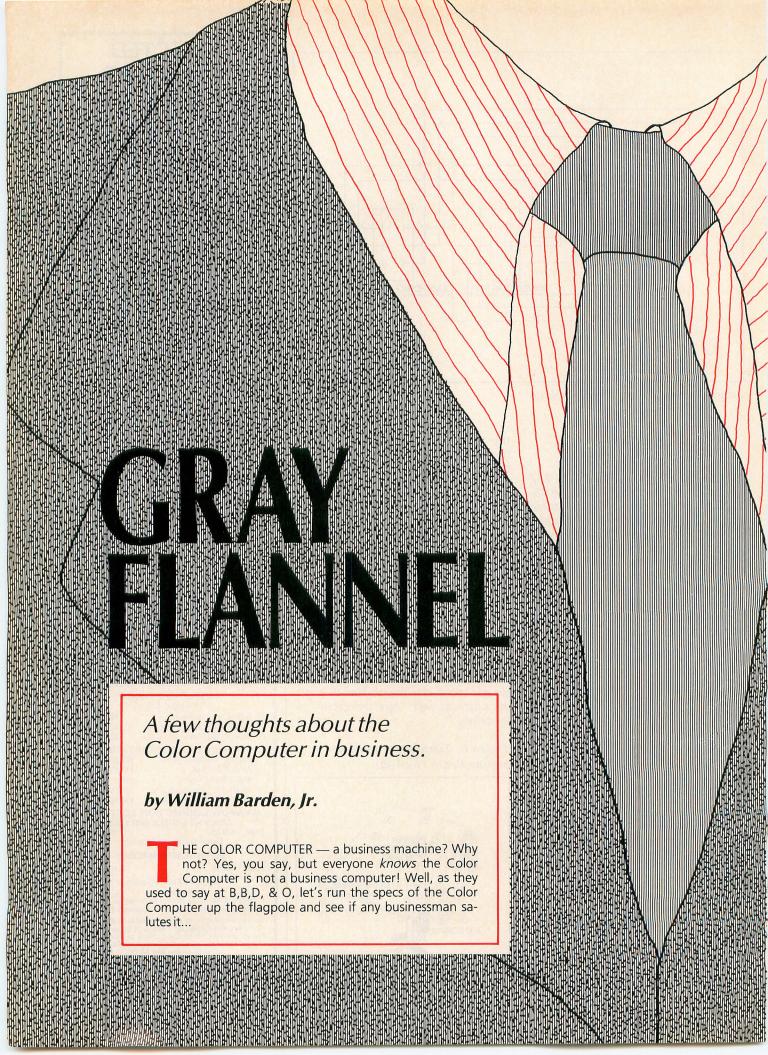
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What are the requirements of a business computer? They're changing rapidly. Ten years ago, small businesses would have killed for a system as versatile as a disk-based Color Computer to run accounting packages, inventory, and reports. Ten years from now, nobody will be able to understand how businesses were able to suffer along with the antiquated IBM PC.

At this point in time, a "business system" might be loosely defined as having these qualities:

- A large quantity of business applications software
- Lots of disk space
- A moderately high-speed printer for reports
- A good keyboard and display
- User friendliness

Does the Color Computer meet these qualifications?

Leaving the question of business applications software aside for the moment, look at the other criteria. The Color Computer has a moderate amount of disk space. You could, for example, add two drives and be up to 320K bytes of disk storage, and that's without having to use any disk space for the operating system, as on some systems. Add two more drives, and you've got 640K bytes. No hard disk

is available as yet, but you can store a lot of data even with two drives.

Now that Radio Shack makes their printers selectable for either parallel or serial interfacing, you can get some very nice printers for use on the Color Computer. A good example is the DMP-120 at 120 characters per second — a bargain at about \$500. Need 132 columns for those massive business reports? You've got the DMP-420 at about \$1000. Certainly there's no lack of any grade of printer for the Color Computer from Radio Shack — or add someone else's serial printer.

The new Color Computer keyboard is not as good as an IBM design, by any means, but it's perfectly adequate for extended typing. The display would admittedly be better at 64 or 80 characters per line, but 32 characters per line is workable.

As far as user friendliness goes, how can an office clerk be intimidated by the Color Computer? I'd certainly think the massive (in comparison) IBM PC would be much more imposing.

This brings us to business applications software for the Color Computer. It's one of those chicken/egg situations. The Color Computer has the user base to support more business packages, but software developers don't perceive it as

a business system. Because there isn't much in the way of business software, nobody considers using it as a business system.

Could the Color Computer function as a business system if there were more applications software? It's certainly a stateof-the-art system with its 6809 microprocessor and the powerful commands of Extended Basic. The disk storage, keyboard, and display are workable as well. When you consider that there are a significant number of people in Great Britain using the Sinclair ZX-81 (the British equivalent of the Timex//Sinclair TS1000 you see advertised for \$29.95) as a serious business system(!), I think it's safe to say the Color Computer is underrated as a potentially good system for small businesses! This especially applies to Mom and Pop operations that don't require and can't afford a Tandy 2000 or IBM PC with printer for \$5500. They can get a system that'll do a fine job at less than half the price — with high-speed printer and disk storage.

Think about it in terms of what constitutes a "business system" currently. You may not need that Model 16 or IBM PC for your small business application after all! And you'll still be able to sneak in sessions of "The Sands of Egypt" after quitting time!

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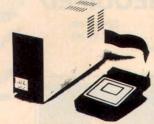
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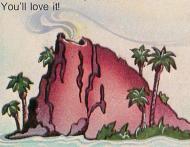
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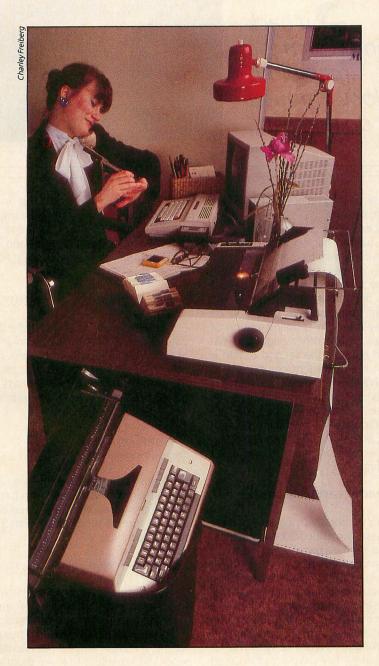
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# Patching Scripsit

by Ashok Basargekar



obert Lake's article in the August, 1983 issue of **The Color Computer Magazine** prompted me to prepare a patch to Scripsit on the RAM for use with my Line Printer VIII.

The Line Printer VIII can run at 1200 baud and I thought it would be nice if Scripsit would let me use this baud with my printer. At first I tried to POKE 150,41 before executing Scripsit, but this did not work. I also tried to add LDX #\$0029 and STX \$95 in Mr. Lake's patch to Scripsit. This also did not work. Finally after careful study of Scripsit, I developed the following patch that permits me to use nine different printer bauds. I have also added a feature that will let me underline any word in the text by enclosing it in the less than and greater than signs. Of course, since these signs are reserved by my patch for the underlining feature, they will not be available for their normal use.

As soon as you EXEC &H6000, a menu for selecting a baud appears on your screen. After the baud rate is selected, the main menu will appear on the screen.

To patch Scripsit with my features, you will need to create the object code of my assembly language program on tape, placed just after Scripsit in RAM. Prepare it following the instructions in Mr. Lake's article. To load the new Scripsit, you simply type CLOADM "SCRIPSIT" and then CLOADM my patch. Some of the original Scripsit's code will be overwritten, and some new codes will be added to Scripsit.

The entire new program can then be CSAVEd on tape: CSAVEM "SCRIPSIT", &H6000, &H7A16, &H6000.

I have tried to add enough comments in my patch to clarify the program. The assembly language program is written using EDTASM+ (Radio Shack).

Listing begins page 40

# Scripsit Redone

# by Ralph Tenny

OLOR SCRIPSIT IS a fairly good word processing package. The program pak version is excellent, except that it uses cassette for storage and lacks some features the disk version has. The disk version unhappily lacks two important features found in the cassette version. Even so, it is a good buy for all except the professional writer who demands high productivity. Most important, all versions of Scripsit are comfortable to use and are easily learned. So, let's avoid some of the shortcomings and improve our operating speed.

Sit back and watch the marvelous Color Computer do the rest."



## **Document Formats**

Formatting a document is most timeconsuming. Business letters have inside addresses and other special arrangements. Each of my Disk Scripsit disks contains samples of various types of documents saved on the disk as an example file. By loading this file instead of starting with an empty file, I can quickly edit the date, address and salutation, then proceed to the letter. Since Scripsit writes over text my new letter soon "eats up" the original document, and I have been able to begin on the body of the letter almost immediately, instead of formatting a new document. The same can be done with cassette Scripsit by saving a short example of each format on a "read only" cassette.

Cassette Scripsit automatically saves the basic print parameters — text width, margins, lines per page, etc. — as part of the tape file, making document reprinting or editing really easy. Unfortunately, Disk Scripsit omitted this excellent feature, so the only possible remedy seems to be to make a cryptic entry in the sample file prompting you to re-enter these parameters in the menu. Disk Scripsit has a limited set of special print emphasis codes built into the print controls menu (option 7); these can be changed to suit your printer. For example, I substituted Epson "start italics" and "stop italics" codes for Radio Shack "start underline" and "stop underline" and "enhanced print" for "start elongation" codes. These new codes remained a permanent record

on the disk, so they do not have to be entered each session.

It has been my experience that Color Scripsit's built-in paging commands do not result in predictable performance on the Epson printer, so I use one of two tricks. The first is to make each page a separate document that stands alone during the print process (and can be printed by the print spooling option of Disk Scripsit while other pages are entered and edited). The second option is to format the document completely on the screen and use the BREAK4 command to print the document, one line at a time. Of course, it gets tiring pressing the Break and numeral 4 keys during an entire page, but what else can you be doing during the print operation if you don't use spooling?

### **Headers and Footnotes**

Although Color Scripsit does not have a satisfactory provision for headers, footnotes and similar special formats, these can be handled one of two ways. Make a trial print-out to determine where pages should end, and edit in the required header or footnote. If you are printing on single pages (with a friction feed printer, for example), you can prepare each page in advance with the required header, then print it as discussed above. Otherwise, simply make the header part of the page during the final edit process.

With mailing labels available in pinfeed format, it is easy to handle them by entering the required names and addresses in some sort of special format and use a Basic program to print the labels. For example, I use this data format:

%Joe Blow/3768 Windy Ave./Tempest NX 99999

By building the data base (the list of names) with slashes and percentage signs as field delimiters, it then becomes easy to write simple Basic programs to print the names in one of two formats. The first format is standard label format:

Joe Blow 3768 Windy Ave. Tempest NX 99999

Because I maintain membership information (almost 300 names) for a national hobby organization, I also need to be able to furnish membership lists using this format:

Joe Blow, 3768 Windy Ave., Tempest NX 99999

After some experimentation I was able to develop Program Listings 1 and 2. They are simple, single-purpose programs to list data from only one file. They work for me; if I had several files to maintain, it would be expedient to make them interactive so they would prompt for a file name, number of copies of each label, number of names, etc.

Programs begin page 42



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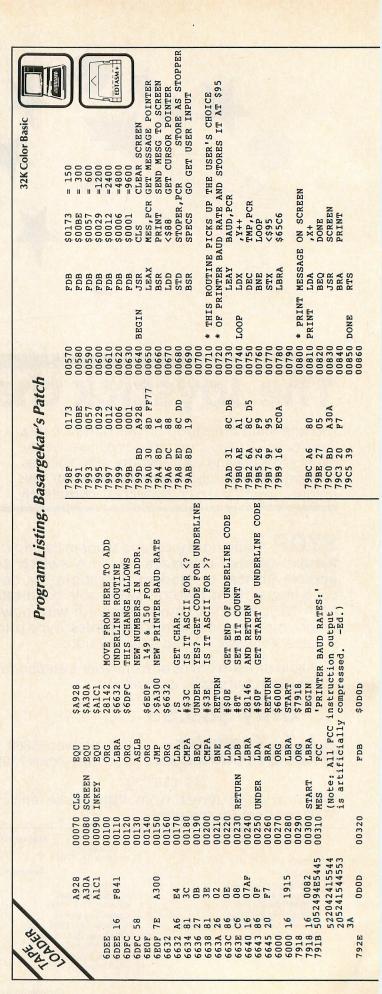
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| 79FE   | 8 D  | 09        | 01220 |        | BSR  | KBSCAN |  |
| 7A00   | 26   | 06        | 01230 |        | BNE  | OUT    |  |
| 7A02   | 86   | 8F        | 01240 |        | LDA  | #\$8F  |  |
|        | 8 D  | 03        | 01250 |        | BSR  | KBSCAN |  |
|        | 27   | F4        | 01260 |        | BEO  | FLASH  |  |
|        | 39   |           | 01270 | OUT    | RTS  | LUMBII |  |
|        | A7   | 9F 0088   | 01280 | KBSCAN | STA  | 10001  |  |
|        | BD   | AlCl      |       |        |      | [\$88] |  |
|        |      |           | 01290 | SCAN   | JSR  | INKEY  |  |
|        | 26   | 03        | 01300 |        | BNE  | OUT1   |  |
|        | 5A   |           | 01310 |        | DECB |        |  |
|        | 26   | F8        | 01320 |        | BNE  | SCAN   |  |
| 7A15   | 39   |           | 01330 | OUT1   | RTS  |        |  |
|        |      |           | 01340 |        |      |        |  |
|        |      | 7918      | 01350 |        | END  | START  |  |
| 00000  | TOT. | AL ERRORS |       |        |      |        |  |
|        |      |           |       |        |      |        |  |
| BAUD   | 7    | 98B       |       |        |      |        |  |
| BEGIN  | 7    | 99D       |       |        |      |        |  |
| CLS    | A    | 928       |       |        |      |        |  |
| DONE   |      | 9C5       |       |        |      |        |  |
| FLASH  |      | 9FC       |       |        |      |        |  |
| INKEY  |      | 101       |       |        |      |        |  |
| KBSCAI |      | A09       |       |        |      |        |  |
| KDBCAL | - // | nu J      |       |        |      |        |  |

SCAN 7A0D SCREEN A30A SPECS 79C6 START 7918 STOPER 7988 TMP 798A UNDER 6643

LOOP

LP

LP1

LP2

LP3 MES OUT

OUT1 PRINT RETURN 79B0

79D8

79DE

7A08

32K Disk Extended Color Basic

# Program Listing. Tenny's Membership List



10 CLEAR2000 20 GOTO1000

30 L1\$=""

35 FOR P=1T0100 '100 CHARS. MAX

PER DATA ENTRY

40 CH\$=MID\$(A\$,P,1)

50 IF CH\$="/" THEN200

60 IF CH\$="" THEN150

70 L1\$=L1\$+CH\$

80 NEXT P

150 PRINT#-2,L1\$:RETURN

200 CH\$=", ":L1\$=L1\$+CH\$

210 NEXT P

1000 OPEN"I", #1, "NIMLIN/TXT"

1005 L=1 'LINE COUNTER FOR LABEL FORMAT

1010 FOR C=1TO300 'READ WHOLE FI

1020 LINEINPUT#1,A\$ 'ONE LINE AT

A TIME 1025 IF A\$="" THEN2000 'END OF F ILE

1030 GOSUB30

1032 L=L+1:IF L>56 THEN2010 'PAGE FORMATTING

2 I ORIMITITIN



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# SOFTMART

5024 E. Departure Drive Raleigh, NC 27604 (919) 876-6124 1037 A\$=MID\$(A\$,2) 'SKIP "%"
2000 CLOSE 1:STOP 'ALL PRINTED
2010 PRINT#-2,CHR\$(12); 'FORM FE
ED
2015 L=1:GOTO1035 'NEW LINE COUN
T FOR NEXT NAME

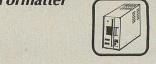
TAPER

#### 32K Disk Extended Color Basic

# Program Listing.

Tenny's Label Formatter





5 CLEAR2000

1035 NEXT C

10 GOTO1000

20 L1\$="":L2\$="":L3\$="":L4\$="":L

5\$=""

30 P=2

40 CH\$=MID\$(A\$,P,1)

55 IF CH\$="/"THEN70

60 L1\$=L1\$+CH\$

63 P=P+1

66 GOTO70

70 P=P+1:CH\$=MID\$(A\$,P,1)

75 IF CH\$="/" THEN90

80 L2\$=L2\$+CH\$

85 GOTO70

90 P=P+1:CH\$=MID\$(A\$,P,1)

95 IF CH\$="/" THEN110

100 IF CH\$="" THEN180

105 L3\$=L3\$+CH\$:GOTO90

110 P=P+1:CH\$=MID\$(A\$,P,1)

115 IF CH\$="/" THEN150

120 IF CH\$="" THEN180

130 L4\$=L4\$+CH\$:GOTO110

150 P=P+1:CH\$=MID\$(A\$,P,1)

155 IF CH\$="" THEN180

160 L5\$=L5\$+CH\$:GOTO150

180 RETURN

1000 OPEN"I", #1, "NIMLIN/TXT"

1010 FOR X=1TO300

1015 LINEINPUT #1,A\$

1017 IF A\$="" THEN1120

1020 GOSUB20

1025 Y=1

1030 PRINT#-2,L1\$:Y=Y+1

1032 PRINT#-2, L2\$: Y=Y+1

1034 PRINT#-2,L3\$:Y=Y+1

1040 IF L4\$="" THEN1100

1050 PRINT#-2, L4\$:Y=Y+1

1060 IF L5\$="" THEN1100

1070 PRINT#-2, L5\$: Y=Y+1

1100 PRINT#-2, CHR\$(13);:Y=Y+1

1115 NEXT X

1120 STOP

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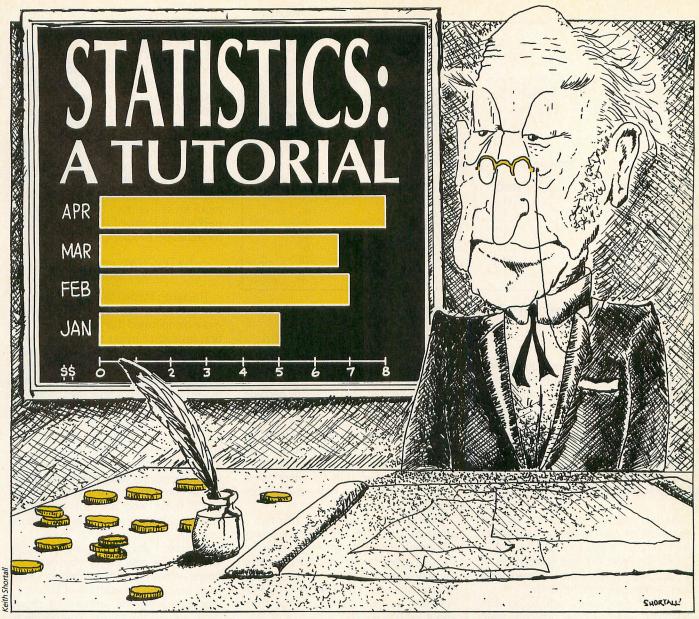
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B EFORE I JOINED the University of Nebraska staff, I recall skipping over statistical programs in computer magazines in my rush to the game or utility programs. This was really unfortunate; many statistics programs can prove useful in personal and business applications, once the user understands a few basic ideas. I will attempt to show you how to use these programs, and discuss statistics in general.

# **Descriptive Statistics**

All statistical procedures can be loosely categorized as *inferential* or *descriptive*. Descriptive statistics describe, or summarize, a group of numbers. Program Listing 1 is my package for doing a group of descriptive statistics on any set of scores. The scores could be almost anything — from sales during the week, to the amount of your phone bills. In the sample output shown in Table 1, the pro-

# by David Lionell Dawson

gram is analyzing the cost of various Color Computer software packages. I wanted to know whether a particular \$39 program was relatively expensive or cheap.

The first set of printed values attempt to find the most typical or average score, or price, in this case. The first of these is the *mean* which is what most people would call the "average." The mean is just the scores added together and divided by the number of scores you are considering. This is a very common descriptive statistic, and is probably familiar to most readers. The mean demonstrates how descriptive statistics describe or summarize — by taking a large group of numbers and turning this group into one score that is representative of them all.

The next value, the *median*, is simply the exact middle score. A formula is used in the program that considers even numbers of scores and tied scores at the middle of the group when the mean calculation is made. This is why the score may appear as a fraction, even when only whole numbers were under consideration. The idea is the same: the median is the middle score.

The median and mean are both important because the mean is affected more by the value of *each* score than is the median. Often the mean is not the best, or most typical, average score. The median is commonly used, for example, when figures are given stating the average income in the United States. To demonstrate why this is done, suppose that only three people live in the U.S., and that they make \$10,000, \$12,000, and \$14,000. The mean here would be \$12,000, and it would be a good estimate of the average.

# **Summary Statistics**Software for Color Computer

|        | CENTRAL VALUE | VARIABI            | ILITY      |
|--------|---------------|--------------------|------------|
| MEAN   | 33.9515001    | RANGE              | 85         |
| MEDIAN | 24.7          | STANDARD DEVIATION | 23.5893629 |
| MODE   | 21.95         | SKEWNESS           | 1.65374558 |
|        |               | KURTOSIS           | 1.45556159 |

#### Software for Color Computer Frequency Distribution

| SCORES  | FREQ | CUMFREQ | CUMPERCENT |
|---------|------|---------|------------|
| 95-110  | 1    | 20      | 1          |
| 79 – 94 | 1    | 19      | .95        |
| 63 - 78 | 1    | 18      | .9         |
| 47 - 62 | 1    | 17      | .85        |
| 31 – 46 | 1    | 16      | .8         |
| 15- 30  | 14   | 15      | .75        |
| -1 - 14 | 1    | 1       | .05        |

Table 1. Output from Descriptive Statistics Program

Now suppose that the person earning \$14,000 wrote and sold a great arcade game; the next year his earnings rose to \$1,000,000. With salaries of \$10,000, \$12,000 and \$1,000,000, the mean is now around \$340,000 — not a very true picture of what the average person makes! The median, or middle score, would still be \$12,000, because it is still the score between the lowest and highest.

The last measure of average score is the *mode*, or merely the score that occurs the most. If you look at Line 10010 of Listing 1, you will find four scores of \$21.95. No other score appears that often, which makes it the mode.

The next two scores have to do with variability, which is how different from each other the numbers we are considering are. Does everyone get a grade of 100 on the test, or is there a wide range of scores?

The first statistical measure of the variability of scores is the *range*. This is merely the high score minus the low score. The *range* is an inferior measure; for example, one very high score on one test in a history class would make a student seem very inconsistent, while all her other test scores might be very close together.

The standard deviation is a much better and more widely accepted measure of variability. This value would be large if, looking for instance at the sales made by your salespeople during a given month, a few sales were very high and a few were very low. The value would be small if all your sales staff did about equally. The standard deviation represents how stretched out the scores are, or how much they differ from each other.

The last two values in the summary statistics portion refer to the shape of the group of scores. This idea will become clearer as we look at each in turn.

Skewness has to do with the number of high scores versus the number of low scores. If there are more high scores than low scores, the skewness would be a negative number; but, if there were more low scores than high, the number would be positive.

Kurtosis is how spread, or pointed, a group of scores are. The more the scores are spread evenly, the more negative the kurtosis score becomes, and the more the scores are the same, or pile up, the more positive the score becomes. Skewness and kurtosis statistics range from about -2.0 to +2.0.

The Frequency Distribution Table gives: the number of scores within a range (labeled FREQ); the number below that range (labeled CUMFREQ); and the percent of the total the CUMFREQ represents (labeled CUMPERCENT). Looking at Table 1, it could be said that 85 percent of the scores are below 53.

# Using the Info

From the sample output in Table 1 we can see that the mean and median are very different. If we also look at Figure 1, we can see there are a few very high scores which, if you remember the earlier discussion, affect the mean more than the median.

Refer to Figure 1; it is easy to understand the skewness and kurtosis numbers. The skewness of 1.65 indicates more low scores than high, as is quite evident in the polygon. The kurtosis of 1.45 means a very peaked distribution, or that

many of the scores are the same — also apparent in Figure 1.

So, what do these final figures mean? It appears that there are a large number of software packages between \$20 and \$30, but also a few costing as much as \$100; the average is about \$24 (using the median). My \$39 program, therefore, is above average. Using the Frequency Distribution Table, I can see that about 80 percent of all packages included in my study cost less than \$39. The software I was considering buying is more expensive than 80 percent of the packages advertised. I decided to look for a cheaper program.

## **Inferential Statistics**

The second broad category of statistics is called *inferential statistics*. These are more complicated than descriptive statistics. Instead of trying to just summarize data, these procedures ask questions like: Is one group in a class really composed of better readers? Are more sales made by older or younger salespeople?

Though more complicated, the answers to this type of question seem more satisfying than those provided by descriptive statistics. This discussion of inferential statistics will be very limited: I will demonstrate what these procedures can accomplish, but I strongly recommend those who are not acquainted with these statistics do some background reading.

Suppose you were interested in whether the new policy you began at home — paying your children an allowance based on completion of chores — was increasing the amount of chores done around the house. You decide to test the idea; you get a measure of the number of chores done by each child for one of the days before you started your new system, and another measure for one of the days after the system took effect. How would you know if there was a real difference?

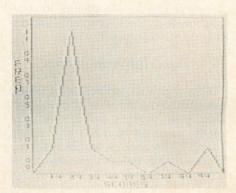


Photo 1. Anova Graph—Frequency Polygon

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| Gold Socket Connectors                           | YES             | NO                  |
| Gold Edge Connector                              | YES             | NO                  |
| <ul> <li>Socketed Integrated Circuits</li> </ul> | YES             | NO                  |
| <ul> <li>Manual Cartridge Selector</li> </ul>    | Pushbutton      | Slide Switch        |
| <ul> <li>Keyboard/Program Selection</li> </ul>   | YES             | YES                 |
| Cartridge ON Indicator                           | YES             | NO                  |
| Extension Cable                                  | YES             | NO                  |
| <ul> <li>Number of Expansion Slots</li> </ul>    | 5               | 4                   |
| Warranty   | 180 days        | 90 days             |
| <ul> <li>User's Manual w/schematics,</li> </ul>  |                 |                     |
| parts layouts and parts lists                    | YES             | NO                  |
|  |                 |                     |



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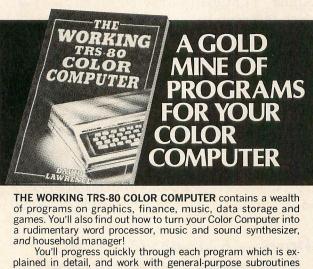
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|   |

Using the Analysis of Variance Program (ANOVA) given in Listing 2, you could produce Table 2, an analysis that would answer this question. The columns SS, df (degrees of freedom), and MS refer to quantities beyond the scope of this discussion, but what is important is the number at the bottom labeled F. The F value can be looked up in a simple table found in any statistics book, and will tell us immediately if the groups are significantly different. To look up the value, use the df which appear to the left of the equals sign: in this case 1 and 3. The 1 is the numerator df and 3 is the denominator df. Find the 1 in the table column and the 3 in the table row (in most tables), and see where they meet. This will give you the critical F. If your F number is large enough, the groups are different. Since many of you do not have a table available to you, as a rule of thumb for degrees of freedom of moderate size, with a total greater than 10, an F of more than four will be significant. As df's become larger the necessary F becomes smaller.

In this example, where df=1,3, the necessary F is 10.13 for P=.05, or a 5 percent chance of being wrong (this percentage is taken from a statistics book). The value found of 2.45 (see Table 2), therefore, is too small for significance, which means the two groups are probably not different. In plain words, you should stop wasting money paying your children for chores, as it does not help.

### **ANOVA**

The ANOVA program presented here allows for repeated measure. This is very rare, but it is much more useful than those programs that require the researcher to place different people in each group being studied. For example, in our allowance test, a non-repeated measures program would require half the chil-

|                                | MEAN  |                          |               |
|--------------------------------|---|--------------------------|---------------|
|                                | Mean for Subject  | t 1 = 1                  |               |
|                                | Mean for Subject  |                          |               |
|                                | Mean for Subject  | t 3 = 3.                 | 5             |
|                                | Mean for Subject  | t4 = 5                   |               |
|                                | Mean for Subject  | t 1 = 2.                 | 5             |
|                                | Mean for Subject  | t 2 = 3.                 | 25            |
|                                | ANOVA Summ  |                          |               |
| SOURCE                         | ANOVA Summ<br>Repeated Measur<br>SS                         |                          |               |
| SOURCE<br>Between S            | Repeated Measur<br>SS                                       | es One V                 | Vay           |
|                                | Repeated Measur<br>SS                                       | es One V                 | Vay           |
| Between S                      | Repeated Measur<br>SS<br>18.375                             | es One V<br>df<br>3      | Vay           |
| Between S<br>Within S          | Repeated Measur<br>SS<br>18.375<br>2.5                      | es One V<br>df<br>3<br>4 | Way<br>MS     |
| Between S<br>Within S<br>Treat | Repeated Measur<br><b>SS</b><br>18.375<br>2.5<br>1.12500003 | es One V<br>df<br>3<br>4 | MS 1.12500003 |

Table 2. Output from ANOVA

| ANDVA S | R YRANKUZ | EPEATEI | DHE WAY   |
|---------|-----------|---------|-----------|
| SOURCE  | SS        | DF      | ms .      |
| BETW.   | 18.375    | 3       |           |
| REAT    | 1,125000  | 03 1    | 1.1250000 |
| RESID.  | 1.374999  | 97 3    | .45833332 |
| TOTAL   | 20.875    | 7       |           |
| F ( 1   | , 3 )= 2, | 454545  | 57        |

```
INSTRUCTIONS (Y/N)? H
KEY (I) FOR KEYBOARD INPUT OF
DATA OR (D) FOR DATA STATEMENTS

D
PRINTER OUTPUT (Y/N)? N
MEANS (Y/N)? Y
MEANS (Y/N)? Y
MEAN SUBJECT 1 = 1
MEAN SUBJECT 2 = 2
MEAN SUBJECT 3 = 3.5
MEAN SUBJECT 4 = 5
MEAN LEYEL 2 = 3.25
```

Photo 2a. and 2b. Data Screens

dren to get an allowance for doing chores, and half to be given allowance money and not do chores. This is clearly impractical, as it would be in a classroom, where it is hard to treat two separate groups differently. With ANOVA this difficulty needn't arise.

The type of data that can be used with this program is quite limited, as are nearly all microcomputer ANOVA programs. If data is collected on the same people in several levels of some condition, this analysis will be appropriate most of the time. Any F larger than 4.0 will be significant, but unless the user has some statistical knowledge the *accuracy* of the result cannot be considered complete. Many topics I have had to skip here are necessary to accurately determine the appropriateness of this analysis for a specific type of data.

# **Using the Programs**

The most important detail when using these programs is to enter the kind of data the program expects, in the expected order. The Descriptive Statistics Program can be used with almost any type of numbers, unlike the ANOVA program. However, the Frequency Distribution Table (Table 1) and graph assume integer or mixed numbers, not all decimal fractions. Multiply all data by a constant if you find yourself with decimal fractions, so answers will be displayed correctly.

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# TEACHERS USING COLOR COMPUTERS, A GENTLE THREE STEP PATH TO EASY CLASSROOM MANAGEMENT

- 1. Send a \$10 check for the demonstration cassette with programs for grading and student information. This may be all you need.
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16K, but has been designed for 32/64K and a printer. A disk drive may become handy.

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The Frequency Distribution Table prints the number of scores within the interval .5 above to .5 below the interval printed — a convention. The graph is similar, and counts and plots the number of scores within the interval represented by its midpoint at the bottom. Most importantly, the graph plots the last two whole numbers in the scores as the horizontal scale, so if you use decimal fractions all the numbers on the horizontal will be zero. Also, if you use very large numbers the horizontal will be difficult to interpret. Use the graph only to get a feeling for the general distribution of the scores, and use the table for precise numbers within specific ranges.

The most obvious and potentially useful modification would be the capability to save data files to disk or tape. A routine to input from tape or disk could be added to Listing 1 after Line 50. The variable N holds the number of data points, and the array D(N)holds the data. Be sure to dimension D in the routine.

The same kind of routine could be added after Line 110 in Program Listing 2. The number of levels is stored in K, the number of subjects in N, and the data in D(K,N). This routine should also contain a dimensioning of the variable D.

A Save routine could be constructed appearing after Line 140 in Listing 1 and Line 180 in Listing 2. If the routines were inserted as suggested, data could still be edited in data statements and then saved to tape or disk.

Statistics can be used in many situations. The first program should be accessible to everyone, while the second should be used with caution — it is the most powerful, but there are many considerations that have not been covered here. However, feel free to experiment with the program; it is a tool used by many scientists and should at least provide insight into scientific methods. I hope my introduction has shown the potential of inferential statistics and will motivate you to continue reading about the subject.

LOADER

## Program Listing 1. Descriptive Statistics





6 REM REMOVE REMARKS TO PROVIDE MORE ROOM FOR DATA IF YOU WISH. 10 PCLEAR4: CLS: PRINT STRING\$ (32, "#")

20 PRINT:PRINT" DESCRIPTIVE STATISTICS":PRINT:PRINT" DAVID LIONELL DAWSON"

30 PRINT: PRINTSTRING\$(32,"#"):PR INT: PRINT"KEY ENTER TO CONTINUE 40 IF INKEY\$="" THEN 40

45 REM OPTIONS.

50 CLS:PRINT@192,"(K) EYBOARD EN TRY OR (D) ATA STATEMENTS":: I NPUT CH\$

60 IF CH\$="D" THEN 110

65 REM KEYBOARD DATA ENTRY.

70 INPUT"NUMBER OF CASES"; N

80 DIM D(N), F(N)

90 FOR X=1 TO N:PRINT "ENTER CAS

E #";X;:INPUT D(X):NEXT

100 GOTO 140

110 CLS:PRINT:PRINT:PRINT"BEGIN DATA IN LINE 10000 GIVE NUMBER OF CASES THEN LIST THE DATA I N ANY ORDER. ": PRINT" IF ALL THE D ATA IS ENTERED KEY 'R' ELSE PRE SS ANY OTHER KEY ANDTHE PROGRAM WILL STOP."

120 N\$=INKEY\$:IF N\$="" THEN 120 ELSE IF N\$<>"R" THEN END

125 REM DATA STATEMENT DATA ENTR

130 READ N:DIM D(N):FOR X=1 TO N :READ D(X):NEXT

140 FOR X=1 TO N:T=T+D(X):NEXT:M=T/N

150 PRINT"COMPUTING ... PLEASE W

AIT ...";

155 REM SORT ROUTINE.

160 FOR X=1 TO N:PRINT"...";:FOR Y=1 TO N:IF D(X) < D(Y) THEN W=D(Y)

Y):D(Y)=D(X):D(X)=W

170 NEXTY, X

175 REM CALCULATE MEDIAN.

180 MI = INT(N\*.5)

185 IF D(MI) <> D(MI+1) AND N/2=INT(N/2) THEN MD=(D(MI)+D(MI+1))/2:GOTO260

190 LL=D(MI)-.5

192 FOR X=MI TO 0 STEP -1: IF D(X

)=D(MI) THEN NEXT

200 NB=X:CC=MI

210 CC=CC+1: IF CC<=N THEN IF D(M

I)=D(CC) THEN CX=CX+1:GOTO210

220 C2=MI

230 C2=C2-1:IF C2>OTHEN IF D(MI)

=D(C2) THEN CZ=CZ+1:GOTO230

240 NW=CX+CZ+1

250 MD = LL + ((N/2 - NB)/NW)

255 REM CALCULATE MODE.

260 CO=1:W=0:FOR X=1 TO N

270 CO = X + 1

280 IF CO < N+1 THEN IF D(X) = D(CO)

THEN IW=IW+1:CO=CO+1:GOTO280

290 IF IW>W THEN W=IW:MO=D(X)

300 IW=0:NEXT X

305 REM CALCULATE STANDARD DEVIA TION.

310 T=0:PRINT"\*\*\*";:FOR X=1 TO N  $:T=T+(D(X)-M)^2:NEXT:SD=SQR(T/N)$ 

315 REM CALCULATE SKEWNESS.

320 T=0:PRINT"\*";:FOR X=1 TO N:T  $=T+((D(X)-M)/SD)^3:NEXT:SK=T/N$ 

325 REM CALCULATE KURTOSIS.

# Telewriter-64 the Color Computer Word Processor

- 3 display formats: 51/64/85 columns × 24 lines
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- Right justification
- Easy hyphenation
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- Color Computer News, Jan. 1982

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Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays:  $64 \times 24$  and  $85 \times 24!!$  Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The  $51 \times 24$  display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, all on the screen at one time. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

# RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

## FEATURES & SPECIFICATIONS:

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Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

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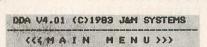
Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

```
330 T=0:PRINT"*";:FOR X=1 TO N:T
=T+((D(X)-M)/SD)^4:NEXT:KU=T/N-3
335 REM CALCULATE RANGE.
340 \text{ RA} = D(N) - D(1)
345 REM DISPLAY STATISTICS.
350 CLS:PRINT@192, "SUMMARY STATI
STICS READY. ": PRINT: INPUT "OUTPUT
 TO (P) RINTER OR
EEN"; Y$: IF Y$="P" THEN 420
360 CLS:PRINT:PRINT:PRINT"SUMMAR
Y STATISTICS": PRINT: PRINT" CENTRA
L TENDENCY": PRINT" MEAN"; M: PRINT"
MEDIAN"; MD: PRINT" MODE"; MO
370 PRINT:PRINT"VARIABILITY":PRI
NT"RANGE"; RA: PRINT"STANDARD DEVI
ATION"; SD: PRINT
380 PRINT"SKEWNESS"; SK: PRINT"KUR
TOSIS"; KU
390 PRINT:PRINT"KEY TO CONTINUE"
400 IF INKEY$="" THEN 400
410 GOTO 480
415 REM PRINT SUMMARY STATISTICS
420 INPUT"NAME OF DATA"; N$: PRINT
#-2, TAB(31) "SUMMARY STATISTICS":
PRINT#-2,"":PRINT#-2,"":PRINT#-2
, N$
430 PRINT#-2, TAB(33) "CENTRAL VAL
UE":PRINT#-2,"":PRINT#-2,"MEAN";
440 PRINT#-2, "MEDIAN"; MD: PRINT#-
2, "MODE"; MO
450 PRINT#-2,"":PRINT#-2,TAB(34)
"VARIABILITY": PRINT#-2,""
460 PRINT#-2, "RANGE"; RA: PRINT#-2
,"STANDARD DEVIATION";SD:PRINT#-
2,""
470 PRINT#-2, "SKEWNESS"; SK: PRINT
#-2, "KURTOSIS"; KU
475 REM CONSTRUCTION OF FREQUENC
Y DISTRIBUTION TABLE.
480 CLS: PRINT@192, "CONSTRUCT FRE
QUENCY DISTRIBUTIONTABLE (Y/N)";
:INPUT Y$:IF Y$="N" THEN 640
490 INPUT "NUMBER OF INTERVALS";
NO: IF NO=0 THEN IF N>15 THEN NO=
15 ELSE NO=N
500 NO=INT((((D(N)+1)/NO)+.5)+.5
510 INPUT"OUTPUT TO (S) CREEN OR
           (P) RINTER"; Y$: IF Y$="
P" THEN 600
520 PRINT"SCORES
                    FREO
                            CUMFRE
  CUM%
```

```
530 FOR X = INT(D(N) + .5) TO D(1) - N
O STEP -NO:PRINTUSING "###";X;:P
RINT"-";:PRINTUSING"###";X+NO-1;
:T=0:FOR Z=1 TO N:IF D(Z)>X-.5 A
ND D(Z)<X+NO-1+.5 THEN T=T+1
540 NEXTZ:PRINT"
                     ":T:
550 PRINT"
              "; N-CF; "
                           ";: IF
CF <= 0 THEN PRINT"1.00":CF=T+CF E
LSE PRINTUSING"#.###"; (N-CF)/N:C
F=T+CF
560 NEXT X
570 PRINT"KEY ENTER"
580 IF INKEY$="" THEN 580
590 GOTO 640
595 REM PRINT DISTRIBUTION TABLE
TO PRINTER.
600 INPUT"NAME"; N$:PRINT#-2,N$:P
RINT#-2,"":PRINT#-2,"FREQUENCY D
ISTRIBUTION": PRINT#-2, STRING$ (80
,"-"):PRINT#-2,"SCORES";TAB(20)"
FREQ"; TAB(40) "CUMFREQ."; TAB(60)"
CUMPERCENT"
610 FOR X=INT(D(N)+.5) TO D(1)-N
O STEP -NO:PRINT#-2,X:"-":X+NO-1
;: T=0: FOR Z=1 TO N: IF D(Z) > X-.5
AND D(Z)<X+NO-1+.5 THEN T=T+1
620 NEXT Z:PRINT#-2,TAB(20)T;:PR
INT#-2, TAB(40)N-CF;: IF CF=0 THEN
 PRINT#-2, TAB(60)"1.00":CF=T+CF
ELSE PRINT#-2, TAB(60)(N-CF)/N:CF
=T+CF
630 NEXT X
635 REM DRAW POLYGON.
640 CLS:PRINT:PRINT:PRINT"POLYGO
N MENU": PRINT@192,"(F) OUR COLOR
 OR (T) WO COLOR";: INPUT Y$: IF Y
$="F" THEN PMODE3,1 ELSE PMODE 4
,1
650 IF Y$="F" THEN INPUT"COLOR O
F POLYGON (6)=CYAN, (7)= MAGENTA
 (8)=ORANGE";C:COLORC,5
660 IF Y$="T" THEN INPUT "COLOR
OF POLYGON (0)=BLACK, (5)=BUFF";
C:IF C=0 THEN COLOR 0,5 ELSE COL
OR 5,0
665 REM CONSTRUCT DRAW STRINGS F
OR NUMBERS.
670 PCLS:DIM NU$(10):NU$(1)="BD1
ND6":NU$(2)="BD1NL3R3D3L6D3R6BU"
:NU$(3)="BDlNL3R3D3NL6D3L6":NU$(
4)="BM+3,+1D4L6NU4R6D2":NU$(5)="
BD1NR3L3D3R6D4L6":NU$(6)="BD1NR3
L3D3R6D4L6U4":NU$(7)="NL3R3D6":N
U$(8)="BD1R3D3NL6D3L6U6R3":NU$(9
)="R3D3ND3L6U3R3"
```

# Disk Drive Analyzer

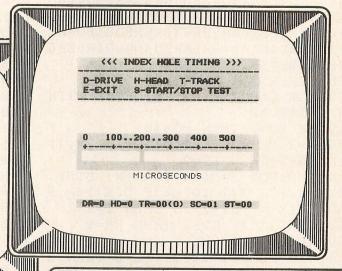
A unique approach to Data Reliability.

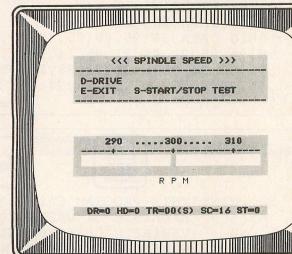


- CLAMPING TEST
- QUICK TEST
- SPINDLE SPEED TEST
- INDEX HOLE TIMING TEST

- ALIGNMENT SENSITIVITY TEST
- HEAD ALIGNMENT TEST

- 7 DIRECTIONAL SEEK TEST 8 HEAD ROTATION TEST A ANALOG ALIGNMENT AID C CHANGE TEST PARAMETERS
- DR=0 HD=0 TR=10(L) SC=01 ST=00





In 30 seconds this program will make the following tests while drives are in your computer.

- Head Alignment
- Motor Speed
- Index Hole Timing
- Azimuth
- Hysteresis

This program may be used to help align your drives without costly test equipment.

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<<< ALIGNMENT SENSITIVITY >>> H-HEAD T-TRACK S-START/STOP TEST D-DRIVE

DR=0 HD=0 TR=16(M) SC=16 ST=00

This program is a must for:

- Dealers—Check drives as they are received. Save time and money on service contracts by quickly isolating drive problems.
- End Users—Check drive performance without costly service calls. Isolate faulty or misaligned drives. Monitor long term drift.

\$79—Single Sided \$99—Double Sided

Terms, COD Cash or Cashier's Check, Visa, MasterCard. Add \$3.00 for shipping in continental United States.

Circle No. 100 on Reader Service Card

680 NU\$(0)="BD1R3D6L6U6R3" 685 REM DRAW LABELS ON GRAPH. 690 LINE (20,0)-(255,176), PSET, B :DRAW "S3BM4,48L8D4NR8D4BD4NR8D4 ND4R8NU4L2D4BD4L8D4NR8D4R8BD4L8D 8NE4NG4R8U8":DRAW"S3BM106,185NR8 D4R8D4NL8BR6NR8U8R8BR6R8D8L8U8BR 14ND8R8D4NL4D4BR6NR8U4NR8U4R8BR6 NR8D4R8D4L8 700 SCREEN1,1 705 REM CALCULATE FREQUENCY WITH IN INTERVAL. 710 IF MO=0 THEN MO=10 720 X=20:ST=INT((D(N)-D(1))/8.2): IF ST<2 THEN ST=2 730 T=0:FOR Z=D(1) TO D(N) STEP ST:T=0:FOR X=1 TO N:IF D(X)>Z-.5AND D(X) < Z + ST - 1 + .5 THEN T = T + 1740 NEXT X:IF T>FE THEN FE=T 750 NEXT Z 760 MH=(FE\*24)+14:IF FE<6 THEN Z =6 ELSE Z=FE 770 IF MH>160 THEN MH=160 775 REM LABEL VERTICAL SCALE. 780 LL=INT(Z/7+.5):FOR X=14 TO 1 58 STEP 24:W\$=STR\$(Z):DRAW"BM14, "+STR\$(X)+NU\$(VAL(MID\$(W\$,LEN(W\$ )-1,1))):DRAW"BM14,"+STR\$(X+8)+N U\$(VAL(RIGHT\$(W\$,1))):Z=Z-LL:IFZ<0 THEN Z=0

790 NEXT X 795 REM LABEL HORIZONTAL SCALE. 800 X=20:FOR Z=D(1) TO D(N) STEP ST:W=INT((Z+ST+Z)/2):X=X+23:IFX>247 THEN NEXT Z ELSE W\$=STR\$(W ): DRAW"BM"+STR\$(X)+",177"+NU\$(VAL(MID\$(W\$, LEN(W\$)-1,1))):DRAW"BM"+STR\$(X+8)+",177"+NU\$(VAL(RIGHT \$(W\$,1))):NEXT Z 810 LINE(20,176)-(20,176), PSET 815 REM DRAW LINES. 820 D=20:FOR Z=D(1) TO D(N) STEP ST:T=0:FOR X=1 TO N:IF D(X)>Z-.5 AND D(X) < Z + ST - .6 THEN T = T + 1830 NEXT X:D=D+24:LINE-(D,176-(M H\*(T/FE))), PSET: NEXTZ 840 LINE-(D+20,176), PSET 850 IF INKEY\$="" THEN 850 860 INPUT "CONTINUE (Y/N)"; Y\$: IF Y\$="Y" THEN RUN ELSE END 875 REM THE FOLLOWING IS SAMPLE DATA (SEE TEXT). 885 REM DELETE THIS BEFORE SAVIN G THE PROGRAM. 10000 DATA 20 10010 DATA 94.95,69.95,49.95,19. 98,24.95,21.95,21.95,14.95,21.95 ,91.95,24.95,9.95,21.95,19.95,29 .95,24.95,19.95,29.95,24.95,39.9

## Program Listing 2. ANOVA



16K Extended Color Basic



1 REM ONE-WAY REPEATED

6 REM FOR EXTRA SPACE FOR DATA D ELETE ALL REMARKS AND USE THE CO MMAND: POKE 25,6:NEW <ENTER>

9 REM BEFORE THE PROGRAM IS LOAD ED.

10 CLS:PRINT@96," ANALYSIS OF VARIANCE":PRINT:PRINT"FOR ONE -WAY DESIGNS": PRINT" WITH REPEATE D MEASURES.

20 PRINT:PRINT STRING\$(32,128):P RINT: PRINT" PROGRAM BY DAVID LION ELL DAWSON BASED ON FORMULAS IN WINER, B.J.STATISTICAL PRINCIPLE S IN EXPER-IMENTAL DESIGN. NEW Y ORK: MCGRAW-HILL, 1971."

30 IF INKEY\$="" THEN 30

40 CLS:PRINT@160,"INSTRUCTIONS ( Y/N)";: INPUTY\$: IF Y\$="N" THEN 10 0

45 REM INSTRUCTIONS.

50 PRINT"THIS PROGRAM CALCULATES AN ANALYSIS OF VARIANCE FO R ONE VARIABLE DESIGNS EVERY SUBJECT APPEARING IN EV ERY LEVEL"

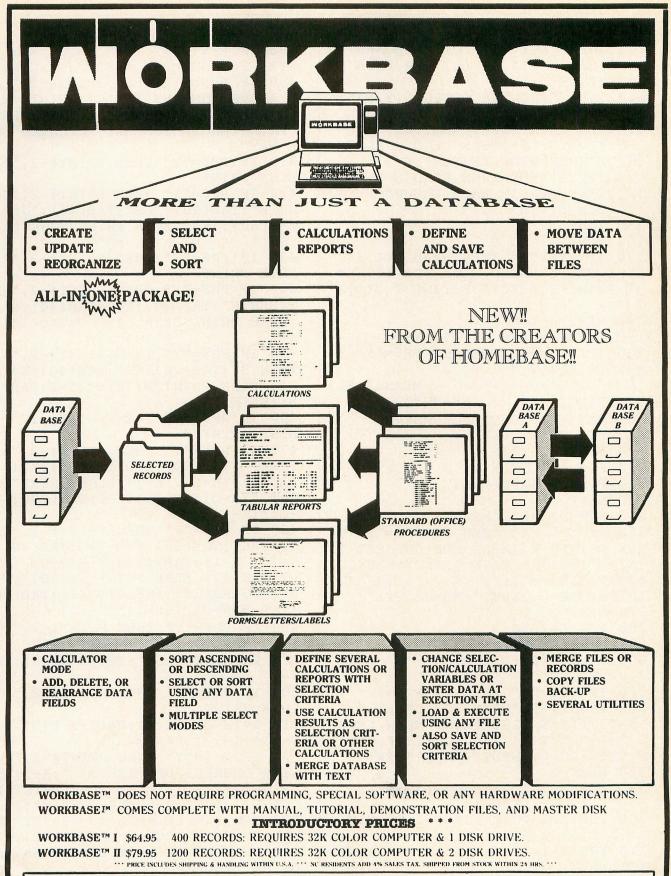
60 PRINT: PRINT" THERE MUST BE EQU AL NUMBERS OF OBSERVATIONS IN E ACH CELL (ONE FOR EACH SUBJECT) BUT THERE MAY BE ANY NUMBER OF LEVELS OF THE VARIABLE."

70 INPUT"(MORE)";XX

80 PRINT"YOU MAY USE EITHER DATA MENTS OR KEYBOARD DATA STATE-IF DATA STATEMENTS ARE ENTRY. USED BEGIN WITH LINE NUMBER 5000."

90 PRINT"THE NUMBER OF LEVELS SH OULD AP- PEAR FIRST THEN THE NUM BER OF SUBJECTS IN EACH THEN T WITH ALL THOSE IN ONE L HE DATA EVEL TO- GETHER IN THE SAME ORDE R IN EACHLEVEL. ": PRINT: PRINT 95 REM OPTIONS.

58/June 1984



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CREDIT CARD ORDERS: CALL TOLL FREE 1-800-334-0854 (EXT 887) WITHIN NC CALL 1-800-672-0101 (EXT 887) WORKBASE™ DATA SYSTEMS P.O. BOX 3448 DURHAM, N.C. 27702

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```
100 INPUT"KEY (I) FOR KEYBOARD I
         DATA OR (D) FOR DATA S
NPUT OF
TATEMENTS."; YY$
110 INPUT"PRINTER OUTPUT (Y/N)";
PP$
115 REM DATA ENTRY ROUTINE.
120 IF YY$="D" THEN READ K ELSE
INPUT"NUMBER OF LEVELS"; K
130 IF YY$="D" THEN READ N ELSE
INPUT"NUMBER IN EACH GROUP"; N
140 DIM D(K,N)
150 FOR L=1 TO K
160 FOR S=1 TO N
170 IF YY$="D" THEN READ D(L,S)
ELSE PRINT"ENTER DATA FOR LEVEL"
; L:PRINT"SUBJECT"; S;: INPUT D(L, S
180 NEXT S,L
190 INPUT "MEANS (Y/N)"; YY$
200 IF YY$="Y" THEN IF PP$="Y" T
HEN PRINT#-2,"
                        MEANS" EL
SE PRINT"
                   MEANS"
205 REM FIND SUMS FOR MEANS.
210 DIM P(N), T(K)
220 FOR S=1 TO N
230 FOR L=1 TO K
240 P(S)=P(S)+D(L,S)
250 NEXT L
255 REM DISPLAY MEANS.
260 IF YY$="Y" THEN IF PP$="Y" T
HEN PRINT#-2, "MEAN FOR SUBJECT "
;S;"=";P(S)/K ELSE PRINT"MEAN SU
BJECT ";S;"=";P(S)/K:C=C+1:IF C>
10 THEN C=0: INPUT" (MORE)";XX
270 NEXT S
280 FOR L=1 TO K
290 FOR S=1 TO N
300 T(L)=T(L)+D(L,S)
310 NEXT S
320 IF YY$="Y" THEN IF PP$="Y" T
HEN PRINT#-2, "MEAN FOR LEVEL "; L
; "="; T(L) /N ELSE PRINT MEAN LEVE
L ";L;"=";T(L)/N:CC=CC+1:IF CC>1
0 THEN CC=0: INPUT" (MORE)";XX
330 NEXT L
340 FOR X=1 TO N:G=G+P(X):NEXT
350 O = (G^2)/(K*N)
360 FOR L=1 TO K: FOR S=1 TO N:T=
T+(D(L,S)^2):NEXT S,L
370 FOR X=1 TO K:H=H+(T(X)^2):NE
XT: H=H/N
380 FOR X=1 TO N: F=F+(P(X)^2): NE
XT: F=F/K
385 REM DISPLAY SUMMARY TABLE
```

```
390 IF PP$<>"Y" THEN INPUT"KEY E
NTER FOR SUMMARY TABLE"; XX:CLS
400 IF PP$="Y" THEN PRINT#-2,"
  ANOVA SUMMARY TABLE": PRINT#-2,
"REPEATED MEASURES ONE WAY" ELSE
 PRINT"ANOVA SUMMARY REPEATED ON
E WAY"
410 IF PP$="Y" THEN PRINT#-2,""
ELSE PRINT
420 IF PP$="Y" THEN PRINT#-2, "SO
URCE"; TAB(20); "SS"; TAB(40); "df";
TAB(60); "MS" ELSE PRINT "SOURCE
                   MS"
          DF
430 IF PP$="Y" THEN PRINT#-2,""
ELSE PRINT
440 IF PP$="Y" THEN PRINT#-2,"BE
TWEEN S"; TAB(20); F-O; TAB(40); N-1
 ELSE PRINT"BETW. ";F-O;TAB(18);
N-1
450 IF PP$="Y" THEN PRINT#-2,"WI
THIN S"; TAB(20); T-F; TAB(40); N*(K
-1) ELSE PRINT"WITHIN"; T-F; TAB(1
8);N*(K-1)
460 IF PP$="Y" THEN PRINT#-2,""
ELSE PRINT""
470 IF PP$="Y" THEN PRINT#-2,"
TREAT"; TAB(20); H-O; TAB(40); K-1; T
AB(60); (H-O)/(K-1) ELSE PRINT"TR
EAT "; H-O; TAB(18); K-1; TAB(20); (H
-0)/(K-1)
480 IF PP$="Y" THEN PRINT#-2,"RE
SIDUAL"; TAB(20); T-H-F+O; TAB(40)
N-1)*(K-1); TAB(60); (T-H-F+O)/((N
-1)*(K-1)) ELSE PRINT"RESID.";T-
H-F+O; TAB(18); (N-1)*(K-1); TAB(20)
); (T-H-F+O)/((N-1)*(K-1))
490 IF PP$="Y" THEN PRINT#-2,"TO
TAL"; TAB(20); T-O; TAB(40); K*N-1 E
LSE PRINT"TOTAL ";T-O;TAB(18);K*
N-1
500 IF PP$="Y" THEN PRINT#-2,""
ELSE PRINT
510 A=(H-O)/(K-1):B=(T-H-F+O)/((
N-1)*(K-1)):F=A/B
520 IF PP$="Y" THEN PRINT#-2,"F
WITH DEGREES OF FREEDOM ";K-1;"
";(N-1)*(K-1);"=";F ELSE PRINT"F
 (";K-1;",";(N-1)*(K-1);")=";F
522 REM SAMPLE DATA TO VERIFY EN
TRY OF THE PROGRAM (SEE TEXT).
523 REM DELETE THIS BEFORE SAVIN
G THE PROGRAM.
5000 DATA 2,4
5010 DATA 1,2,3,4
5020 DATA 1,2,4,6
```

# An Important Bulletin for Home Computer Users

This is the only programming system you'll ever need for your home computer.

If you own a small home computer, the story we're about to tell you could be of great help. It's about a revolutionary new software programming system that will let you and your entire family take full advantage of that machine you bought. But first things first, so here's a list of the home computers this product was specifically designed for: Atari 400, 600, 800, XL Series; Commodore Pet, VIC 20 and 64; IBM PCJr; TRS-80 color computer; TI-99/4A and the Timex Sinclair 1000, 2048 and 2068. If you own one of these computers, it would be well worth your time to read further.

# THE PROBLEM WITH HOME COMPUTERS

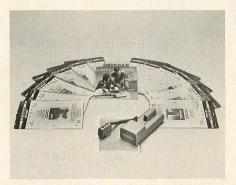
As you probably know, the problem with these small computers is how to get good software into them. Keyboard entry is too time consuming. Diskettes do the job well, but the loaders are expensive and so are the diskettes. Cassette loading is less expensive, but the cassettes themselves still aren't cheap and sometimes a program has to be read again and again before it actually is entered. Furthermore, few of these software manufacturers guarantee their product to run at all.

So unfortunately, a lot of these potentially useful computers are relegated to just game-playing or, even worse, they find their way onto a closet shelf somewhere behind the bowling ball or last year's magazines.

#### THE SOLUTION IS DATABAR SOFTWARE

Now, thanks to the engineers at Databar Corporation, you can bring your computer back to life. They have developed OSCAR which stands for an Optical Scanning Reader. What it does is read a bar code program in much the same manner as your local supermarket reads the bar code information on your grocery products. OSCAR plugs directly into your computer, and can read even complex programs extremely fast. In fact, in a recent time test it took a graduate computer programmer 1 hour, 9 minutes and 43 seconds to successfully type-in a program. To enter that same program, it took an eight-year-old child with no computer experience only eight minutes and

With OSCAR, programming is also inexpensive. The bar code programs read by OSCAR are printed on paper, making the programs inherently a lot less costly to produce than cassette tapes or diskettes. And because the programs cost less to produce, they can be sold to you for significantly less.



But, just because they cost less doesn't mean they aren't of the highest quality. In fact, they are so good and reliable, we are almost alone among software manufacturers to guarantee our product to run as advertised.

Databar Corporation has already developed an extensive library of programs ranging in subject matter from non-violent games to science, health, home management, writing skills and more. These programs are readily available at your local computer store and they retail for under \$10 (about 1/3 what a diskette costs).

#### THE DATABAR CLUB

But amazingly, you can get great software programs for an unbelievable \$1.25 each—if you choose to join the Databar Club. Every charter member gets 12 monthly issues of the Databar magazine each featuring at least eight great programs. In addition, this

family oriented magazine also features articles on related subjects and computer use in general. The subjects covered by the software include: games, home management, classroom learning, health, law, science, writing skills, and computer programming. What's more, Databar Club members get a three-ring binder for their software programs as well as eligibility for exciting contests.

But whether you join the Databar Club or purchase individual program packages from your favorite retailer—OSCAR can dramatically change the amount and quality of the use you get out of your computer. And let's face it: in the not so distant future much of an individual's competence will be tied up in how well he or she interfaces with a computer.

This trial offer includes OSCAR plus the premier issue of Databar magazine. OSCAR is backed by a full 1-year warranty and if you aren't 100% satisfied with OSCAR, then you can return the unit within 30 days for a full refund.

To order, credit card holders call toll free and ask for OSCAR, or send a check plus \$1.50 for shipping and handling for each unit ordered.

OSCAR with the premier issue of Databar magazine can be yours for only \$79.95. And the premier edition of Databar magazine provides all details necessary for joining the Databar Club. So send for your OSCAR today—and take full advantage of your computer tomorrow.

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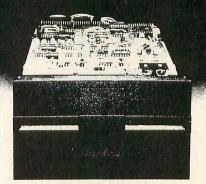
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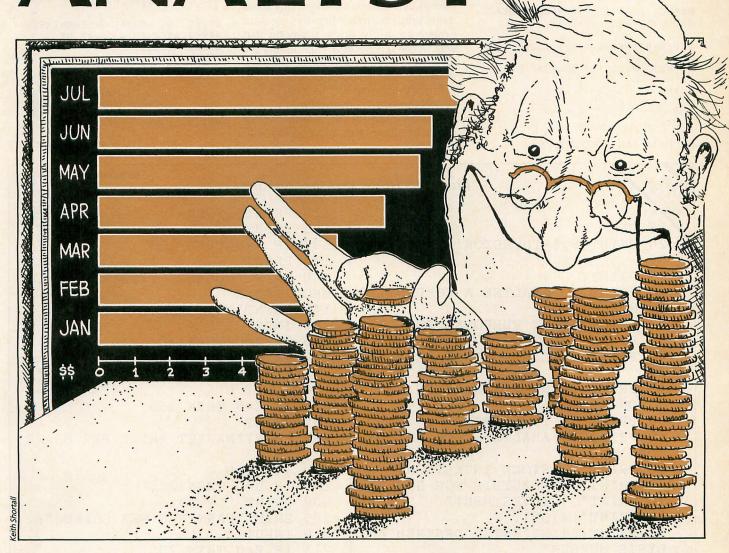
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Analyze financial statements the way your broker would.

# INVESTOR'S ANALYST



analyze a company's assets: common stocks, preferred stocks, and bonds for investment value. Serious investment in corporate stocks or bonds is complex because of the quantity of information that must be analyzed. The financial section of the daily paper can give you a stock's transaction volume, or quote the day's prices, but this is not nearly enough. When you invest in a company's stock, you become a part owner; by pur-

# by Daniel C. Jamet

chasing bonds, you become a creditor of the company.

Before using the program you'll need the financial statements of the company in which you're considering investing. The analysis should be based on the company's latest annual report (available to the public from the company or through brokerage firms).

Run the program and the menu gives you the options of analyzing common stocks, preferred stocks, or bonds.(See Photo 1. The program should be used to analyze convertible preferred stocks as common stock.) Make your selection; you are then asked to enter data. You can locate all the data needed in the financial statements. Enter the data as

prompted; the ratios will be computed and displayed on screen, and the significance of each ratio will be given (as shown in Photo 1b).

### **Pointers**

Here are a few pointers for potential investors. For common stocks investment, look first at each company's earnings record. Earnings per share and divi-

IMPUT THE FOLLOWING INFORMATION

HET INCOME AVAILABLE FOR COMMON STUCK=? 17467000

NUMBER SHARES OF COMMON STOCK DUTSTANDING=? 254670

DIVIDENT PER SHARE=? 1.26

MARKET PRICE PER SHARE=? 36.3

EARMINGS PER SHARE=1 24.0

CONMON STOCKHOLDERS'
EQUITY=7 125930

Photo 1a. Data Entry Screen

dends per share are of particular interest. Potential preferred stockholders should be interested in the yield on their investment. The measurement of the safety of an investment in preferred stock is the firm's ability to meet its preferred dividend requirements. Potential bondholders should pay particular attention to these three factors:

- The rate of return on their investment;
- The firm's ability to meet its interest requirements;
- The firm's ability to repay the principal of the debt when it falls due.

Don't expect to buy stocks, watch their value increase, sell them, buy some more, and keep repeating this pleasant experience. It just doesn't happen that way. While it is necessary to identify the underlying trend over a long time period, it is impossible to spot the high and low points in the shorter swings. Even professionals can't do it consistently.

Possible goals for the careful investor might be: long-term appreciation with little emphasis on current yield; relatively high current income that will increase over the years; or a combination of both. It is also safer to invest with companies that have top-quality management and a strong financial position. These companies are among the innovative and aggressive leaders in a growing industry. Their sales, earnings and dividends are increasing and have good prospects of increasing in the future.

EARNINGS PER SHARE ON COMMON STUCK= \$68.59

SIGNIFICANCE

GIVES THE AMOUNT OF EARNINGS APPLICABLE TO A SHARE OF COMMON STOCK.

PRESS (ENTER) TO CONTINUE?

Photo 1b. Same Results Screen

# Program Listing. Investor's Analyst

16K Extended **Color Basic** 



- LOADER 15 CLS
  - 20 PRINT@6, "-INVESTOR'S ANALYST-
  - 25 PRINT
  - 30 PRINT"TO ANALYSE A COMPANY FO
  - R INVES-"
  - 35 PRINT"TMENT PURPOSES ITS LATE
  - ST FINAN-"
  - 40 PRINT"CIAL REPORT IS REQUIRED
  - 45 PRINT: PRINT" (1) ANALYSIS FOR C OMMON STOCK"
  - 50 PRINT" INVESTMENT"
  - 55 PRINT"(2) ANALYSIS FOR PREFERR ED"
  - 60 PRINT" STOCK INVESTMENT"
  - 65 PRINT"(3) ANALYSIS FOR BOND"
  - 70 PRINT" INVESTMENT"
  - 75 PRINT"(4)QUIT"
  - 80 PRINT: PRINT" ENTER DESIRED ANA
  - LYSIS NUMBER"
  - 85 Z\$=INKEY\$
  - 90 IF Z\$="" THEN 85
  - 95 ON VAL(Z\$) GOTO 100,550,805,1
  - 050
  - 100 CLS : COMMON STOCK
  - 105 PRINT"INPUT THE FOLLOWING IN FORMATION"
  - 110 PRINT
  - 115 PRINT"NET INCOME AVAILABLE F
  - OR COMMON"

- 120 PRINT"STOCK=";
- 125 INPUT A
- 130 IF A=0 THEN 115
- 135 PRINT
- 140 PRINT"NUMBER OF SHARES OF CO
- MMON STOCK"
- 145 PRINT"OUTSTANDING=";
- 150 INPUT B
- 155 IF B=0 THEN140
- 160 PRINT
- 165 PRINT"DIVIDENDS PER SHARE=";
- 170 INPUT C
- 175 IF C=0 THEN 165
- 180 PRINT
- 185 PRINT"MARKET PRICE PER SHARE
- =";
- 190 INPUT D
- 195 IF D=0 THEN 185
- 200 PRINT
- 205 PRINT"EARNINGS PER SHARE=";
- 210 INPUT E
- 215 IF E=0 THEN 205
- 220 PRINT
- 225 PRINT"COMMON STOCKHOLDERS'"
- 230 PRINT"EQUITY=";
- 235 INPUT F
- 240 IF F=0 THEN 225
- 245 PRINT
- 250 PRINT"OPERATING EXPENSES=";
- 255 INPUT G
- 260 IF G=0 THEN 250

265 PRINT 270 PRINT"NET SALES="; 275 INPUT H 280 IF H=0 THEN 270 285 PRINT: PRINT" DO YOU NEED TO C HANGE ANY OF" 290 PRINT"THE ABOVE VALUES? YES OR NO";: INPUT P\$ 295 IF P\$="YES" THEN 100 300 IF P\$="Y" THEN 100 305 IF P\$="N" THEN 310 310 LET EPS=A/B 315 LET DY=C/D 320 LET PER=D/E 325 LET BVS=F/B 330 LET OER=G/H 335 CLS 340 PRINT: PRINT" EARNINGS PER SHA RE ON COMMON" 345 PRINT USING"STOCK=\$\$###.##"; EPS 350 PRINT 355 PRINT@138, "SIGNIFICANCE" 360 PRINT: PRINT GIVES THE AMOUNT OF EARNINGS" 365 PRINT"APPLICABLE TO A SHARE OF" 370 PRINT"COMMON STOCK." 375 PRINT@480, "PRESS <ENTER> TO CONTINUE";: INPUT Z\$ 380 CLS 385 PRINT: PRINT USING DIVIDEND Y IELD=%###.##";DY 390 PRINT@138, "SIGNIFICANCE" 395 PRINT: PRINT" SHOWS THE RATE E ARNED BY" 400 PRINT"STOCKHOLDERS BASED ON CURRENT 405 PRINT"PRICE FOR A SHARE OF S TOCK." 410 PRINT@480, "PRESS <ENTER> TO CONTINUE"::INPUT Z\$ 415 CLS 420 PRINT: PRINT USING "PRICE-EARN ING RATIO=##.#"; PER 425 PRINT@138, "SIGNIFICANCE" 430 PRINT: PRINT "INDICATES WHETHE R PRICE OF" 435 PRINT"STOCK IS IN LINE WITH EARNINGS." 440 PRINT@480, "PRESS <ENTER> TO CONTINUE";: INPUT Z\$ 445 CLS

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450 PRINT: PRINT BOOK VALUE PER S HARE OF" 455 PRINT USING COMMON STOCK=\$\$# ##.##";BVS 460 PRINT@138, "SIGNIFICANCE" 465 PRINT: PRINT" MEASURES THE REC ORDED VALUE" 470 PRINT"OF NET ASSETS BEHIND E ACH" 475 PRINT"SHARE OF STOCK." 480 PRINT@480, "PRESS <ENTER> TO CONTINUE";:INPUT Z\$ 485 CLS 490 PRINT: PRINT USING "OPERATING EXPENSE RATIO=##.#";OER 495 PRINT@138, "SIGNIFICANCE" 500 PRINT: PRINT "INDICATES MANAGE MENT'S ABILITY" 505 PRINT"TO CONTROL EXPENSES." 510 PRINT: PRINT WOULD YOU LIKE T O DISPLAY" 515 PRINT"RATIOS AGAIN? YES OR N O"::INPUT P\$ 520 IF P\$="YES" THEN 335 525 IF P\$="Y" THEN 335 530 IF P\$="NO" THEN 540 535 IF P\$="N" THEN 540

540 PRINT@480, "PRESS <ENTER> FOR MENU";: INPUT Z\$ 545 GOTO 15 550 CLS: PREFERRED STOCK 555 PRINT"INPUT THE FOLLOWING IN FORMATION" 560 PRINT 565 PRINT"DIVIDEND PER SHARE OF PREFERRED" 570 PRINT"STOCK="; 575 INPUT A 580 IF A=0 THEN 565 585 PRINT 590 PRINT"MARKET PRICE PER SHARE OF" 595 PRINT"PREFERRED STOCK="; 600 INPUT B 605 IF B=0 THEN 590 610 PRINT 615 PRINT"NET INCOME AVAILABLE F OR" 620 PRINT"PREFERRED STOCK="; 625 INPUT C 630 IF C=0 THEN 615 635 PRINT 640 PRINT"ANNUAL PREFERRED DIVID

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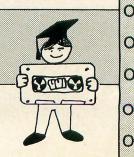
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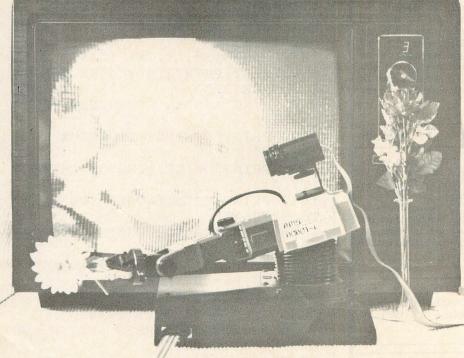
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645 INPUT D 650 IF D=0 THEN 640655 PRINT: PRINT DO YOU NEED TO C HANGE ANY OF" 660 PRINT"THE ABOVE VALUES? YES OR NO";: INPUT P\$ 665 IF P\$="YES" THEN 550 670 IF P\$="Y" THEN 550 675 IF P\$="NO" THEN 685 680 IF P\$="N" THEN 685 685 LET PDY=A/B 690 LET TDE=C/D 695 CLS 700 PRINT: PRINT USING "DIVIDEND Y IELD=%###.##";PDY 705 PRINT@138, "SIGNIFICANCE" 710 PRINT: PRINT" SHOWS THE RATE E ARNED BY" 715 PRINT"STOCKHOLDERS BASED ON CURRENT" 720 PRINT"PRICE FOR A SHARE OF S TOCK." 725 PRINT@480, "PRESS <ENTER> TO CONTINUE";: INPUT Z\$ 730 CLS 735 PRINT: PRINT"TIMES PREFERRED DIVIDENDS" 740 PRINT USING "EARNED=##.#"; TDE

745 PRINT@138, "SIGNIFICANCE" 750 PRINT: PRINT" SHOWS THE ADEQUA CY OF CURRENT" 755 PRINT"EARNINGS TO PAY DIVIDE NDS ON" 760 PRINT"PREFERRED STOCK." 765 PRINT: PRINT WOULD YOU LIKE T O DISPLAY" 770 PRINT"RATIOS AGAIN? YES OR N O";:INPUT P\$ 775 IF P\$="YES" THEN 695 780 IF P\$="Y" THEN 695 785 IF P\$="NO" THEN 795 790 IF P\$="N" THEN 795 795 PRINT@480, "PRESS <ENTER> FOR MENU";: INPUT Z\$ 800 GOTO 15 805 CLS: BOND 810 PRINT"INPUT THE FOLLOWING IN FORMATION" 815 PRINT 820 PRINT"OPERATING INCOME="; 825 INPUT A 830 IF A=0 THEN 820 835 PRINT 840 PRINT"ANNUAL INTEREST EXPENS E=";

845 INPUT B

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850 IF B=0 THEN 840

855 PRINT

860 PRINT"TOTAL LIABILITIES=";

865 INPUT C

870 IF C=0 THEN 860

875 PRINT

880 PRINT"TOTAL ASSETS=";

885 INPUT D

890 IF D=0 THEN 880

895 PRINT:PRINT"DO YOU NEED TO C HANGE ANY OF"

900 PRINT"THE ABOVE VALUES? YES

OR NO";: INPUT P\$

905 IF P\$="YES" THEN 805

910 IF P\$="Y" THEN 805

915 IF P\$="NO" THEN 925

920 IF P\$="N" THEN 925

925 LET NIE=A/B

930 LET DR=C/D

935 CLS

940 PRINT:PRINT"NUMBER OF TIMES INTEREST"

945 PRINT USING"EARNED=##.#"; NIE

950 PRINT@138, "SIGNIFICANCE"

955 PRINT:PRINT"MEASURES THE COV ERAGE OF INTER-"

960 PRINT"EST REQUIREMENTS, PART ICULARLY"

9.65 PRINT"ON LONG TERM DEBT."

970 PRINT@480, "PRESS <ENTER> TO CONTINUE";:INPUT Z\$

975 CLS

980 PRINT:PRINT USING"DEBT RATIO

=%###.##";DR

985 PRINT@138, "SIGNIFICANCE"

990 PRINT: PRINT" INDICATES THE PERCENTAGE OF"

995 PRINT"ASSETS FINANCED THROUG H BOR-"

1000 PRINT"ROWING; IT SHOWS THE EXTENT"

1005 PRINT"OF TRADING ON THE EQUITY."

1010 PRINT:PRINT"WOULD YOU LIKE TO DISPLAY"

1015 PRINT"RATIOS AGAIN? YES OR NO";:INPUT P\$

1020 IF P\$="YES" THEN 935

1025 IF P\$="Y" THEN 935

1030 IF P\$="NO" THEN 1040

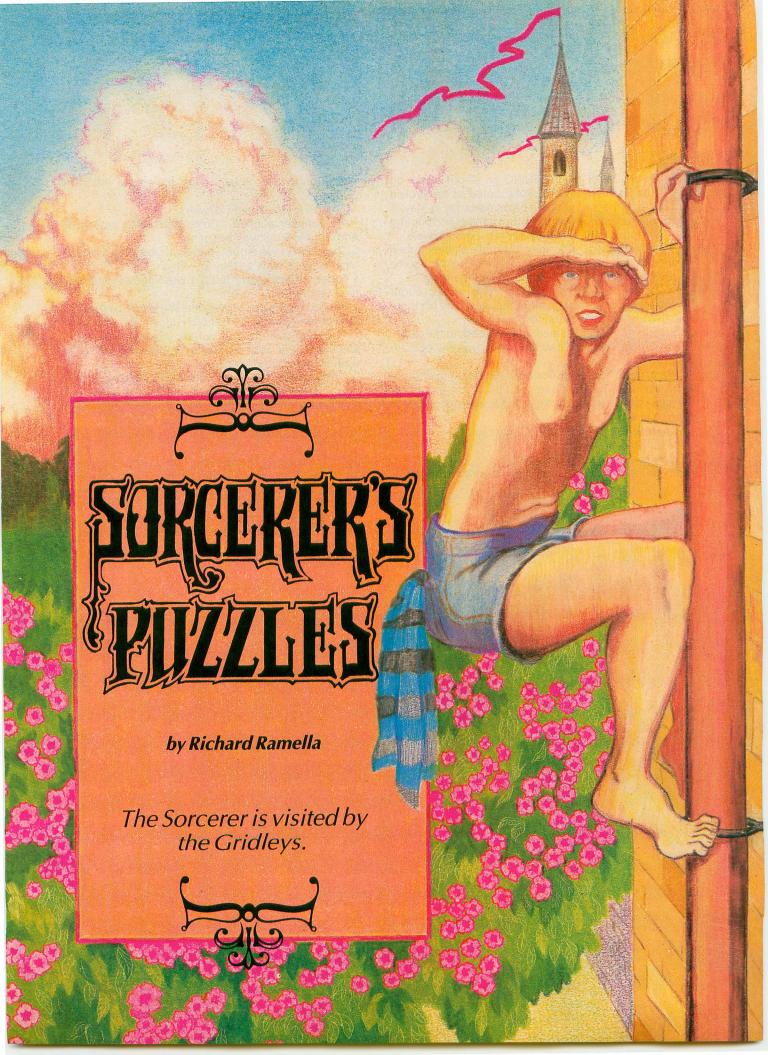
1035 IF P\$="N" THEN 1040

1040 PRINT@480, "PRESS <ENTER> FO

R MENU";:INPUT Z\$

1045 GOTO 15

1050 END



PRING WAS THREATENING an all-out attack on the Sorcerer's castle, Poke noted as he strolled along the parapet on a balmy Saturday in May. A profusion of rainbow weed, prism pansies and bunting vine lapped happily at the base of the granite walls.

The boy did a little jig on the grave of winter, then decided to shinny down a rainspout to pick some wildflowers for Sunflower. It seemed only fitting.

Before he could hop over the crenel, his eye caught a wide, sweeping movement in the west. The hill there was aswarm with... Somethings!

"Invasion!" Poke screamed, running back to the castle. "Fill the moat! Man the battlements! Lower the portcullis!"

"Here, here!" Sorcerer Donald E. Goldberg said somewhat testily. He was trying to get a bit of sun and nap at the same time. He rose from a rather handsome carved patio chair and shaded his eyes.

"There are hundreds of them!" Poke said.

"Yes, there are, lad."

"How will we defend ourselves?"

"By giving them copious amounts of strawberry seltzer

tonic. Don't worry, Poke, it's just the annual visit of the Gridleys."

"As in Fire when ready, Gridleys?"

The Sorcerer laughed. "Go tell Bob there's work to do. And you and Sunflower help him."

The Gridleys were good-humored, roly-poly creatures. Most were as wide as they were high. Short of ordering a battery of laboratory tests, it was impossible to tell if they were human.

It fell to Sunflower to welcome the leader of the thousand or so creatures — a General Pudge.

"Hut-two-three-four. Hut-two-howdy!-three-four!" said the general as he entered the room. He didn't simply walk. He marched at 90-degree angles.

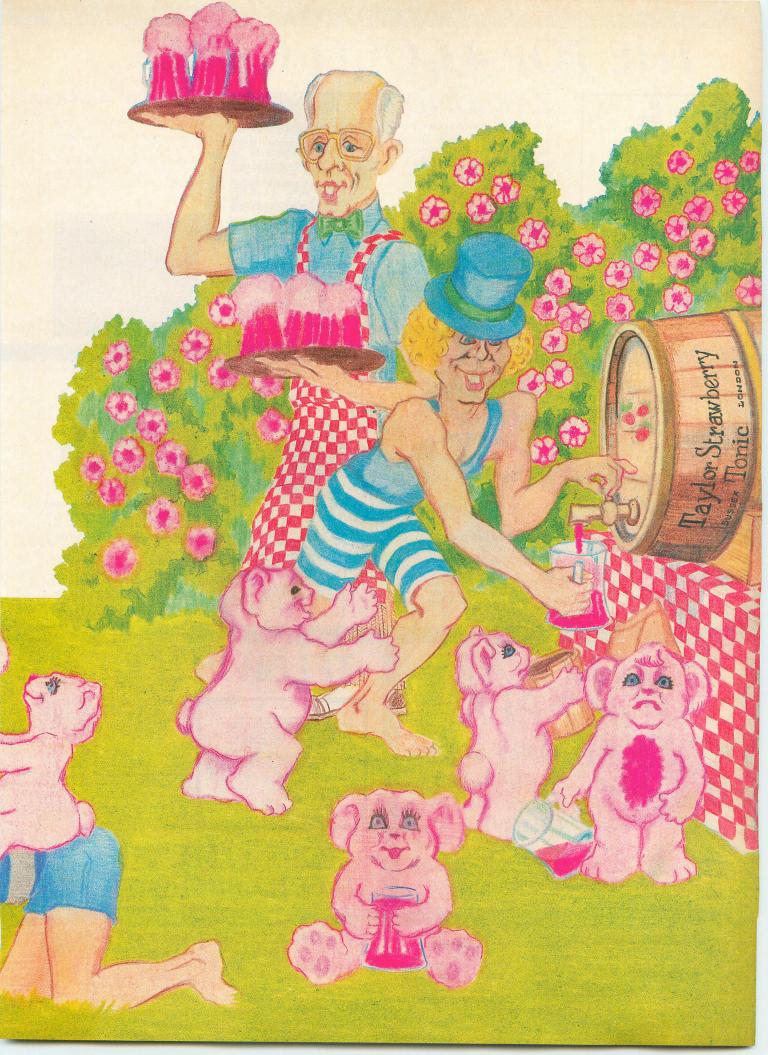
"Welcome to the Sorcerer's castle," the girl said.
"We're happy to be here," said General Pudge.

"I'll show you to your room," Sunflower offered.
"I know where it is, dumpling. Want to dance?"

"No, there's no music. And I'm not a dumpling."

"That's okay," said Pudge. "There's a song in my heart." And with that he hut-two-three-foured away. Sunflower followed, watching this curious, restrained style of dancing. Pudge did not abandon his 90-degree travel. This caused him to traverse the entire labyrinth of the Four Great Blue Hallways of the castle, until he came to his room, which was only a few steps from where he began his trek (see puzzle "Square Dance")





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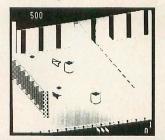


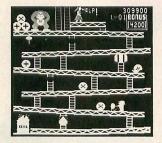
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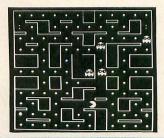


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2 1 2 3 4 5 6 7 8 9 0 ! " \$ \$ 2 & " ( ) X = [ 3 ;
a b t d e f s h i j k l h n o p q r s t u v x x y
2 , . / i < > ? + ! " \$ \$ 2 & " ( ) X : = - II

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"Say, I almost forgot!" Pudge said, snapping his fat little fingers with limited success. "I left my four ponies in the stable, and I need someone to go down there and switch their positions."

"All right," Sunflower said doubtfully,
what do I do?"

Pudge grinned. "Those silly things believe they're chess pieces, and that's the only way they'll move. The magenta ones and the orange ones have to be switched. You'll figure it out." (see "Knightly Pursuits".)

Sunflower started to leave, then turned. "Why do all you Gridleys only go places in straight lines and right angles?"

Pudge started. "What do you know?" he asked.

"Nothing," said Sunflower. "I was just asking."

"Straight lines and right angles are the most efficient means of movement," the general said with a frown. "Right?"

"Not necessarily," the girl said.

"Ah-hah, you do know!" The little general moved very close. "You've heard of our research," he whispered.

"What research?"

"Observe," said Pudge. He pointed to a chair. "I want to go to that chair, but I am facing somewhat away from it. To reach the chair, I march five steps forward, do a sharp left face and approach the chair."

"If you're so inclined," Sunflower allowed.

"But then there's the Diagon Theory," Pudge said. "It's still experimental, but our scientists are moving closer every day to irrefutable proof that to reach that very chair, it is only necessary to walk diagonally toward it."

"I shall hope night and day for suc-

cess," Sunflower smiled.

"You're a kind girl," Pudge said, "and for being so nice, I will show you the preliminary results of our research this evening after I've had a few strawberry seltzer tonics."

"You're going to attempt diagonal movement?"

"Do I look crazy?" Pudge asked. "No, we have a little test model for diagonal movement, and I shall let you have a go

at (and he whispered in the smallest of voices) The Diagons!"

#### Sorcerer's Notes

"Square Dance works in 4K Color Basic and 4K MC-10 Basic. Four overlapping blue rectangles are drawn, and a flashing orange cursor appears. The object is to turn the entire network of lines to orange by traveling it. First, take the orange cursor to the starting position you want by tapping the letter A for north, Z for south, the comma key for west, and the period key for east. When ready to challenge the pathway, tap the asterisk key, holding down the shift key as you do. At this point, the number 215 appears at top left screen. Now your travels will leave a trail of orange, and the number will be reduced by one each time a position of the network turns orange. If, the first time you arrive at any intersection, you leave it by turning left or right, the intersection will remain blue, allowing you to travel through it a second time. When the network is entirely orange, you will be recognized as a winner. You will have to recognize losing positions for

yourself and start over.
"Knightly Pursuits" works in 16K Color Basic and 20K MC-10 Basic. A stable with nine stalls in a three-by-three grid holds four horses: magenta in the northwest and northeast stalls, orange at the southwest and southeast. Object is to reverse the positions, ending with orange ponies at northwest and northeast, magenta at southwest and southeast. A small flashing cursor may be moved among the stalls by tapping the arrow keys. To move a horse, position the cursor in the stall of the horse that will travel and tap M for move. The word WHERE? will appear on the screen and then be erased. The horses' moves must mimic those of a knight on a chess board two squares in one direction and then one left or right. To select a move, bear in mind W stands for west, N for north, E for east and S for south. Then tap any of the following eight applicable compass directions: NNW, WWN, WWS, SSW, SSE, EES, EEN, NNE. You will see your direction displayed at the top right of the screen. If nothing happens when you attempt to move, the move is illegal, such as attempted moves out of the stable, into an occupied stall, or from an unoccupied stall. To erase a botched move entry, tap x. The computer recognizes a winning position. It also knows the minimum number of moves required to win and will inform you if you win in that number. Otherwise, it will not reveal the number but will let you know you can better your score.

"The Diagons" works only in 16K Extended Basic. A four-by-five playing board is drawn. In the top row are magenta diagons, and the bottom row has orange diagons. The object is to reverse the colors by moving according to strict rules. Note a small dark circle over the diagon in the northwest corner square. This is a cursor and may be moved by tapping the arrow keys. This cursor must be positioned on the diagon to move. To make a move, two choices must be made in turn. First, tap 1, 2 or 3 for the number of squares you will move the piece diagonally. Next, tap any of the following letters to take the piece in the direction they represent: A - northwest, s - northeast, z - southwest, x - southeast. Both colors of diagons may move up and down. The game is lost if two diagons of different colors wind up in any diagonal row. A winning position is recognized by the computer. There is a rare situation when an incorrect move command can put diagons in the same slanting row without recognizing the losing pattern until the next move has been made. Consider this a secret present from the Sorcerer.

**4K Color Basic** 

TAPER

#### Program Listing. Square Dance



120 CLS 130 CLEAR 100

140 PRINT @ 233, "SQUARE DANCE";

150 FOR T=1 TO 30

160 SOUND RND(8)\*13,1

170 NEXT

180 U\$="A"

190 D\$="Z"

200 L\$=" ."

210 R\$="."

220 YS="WINNER"

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# VIP Writer™

#### additional (Formerly Super "Color" Writer II) By Tim Nelson RATED TOPS IN RAINBOW, HOT COCO, COLOR Cost!! COMPUTER MAGAZINE & COLOR COMPUTER WEEKLY

The most powerful and easy-to-use word processor is available in the showpiece and workhorse of the Library: The VIP Writer™. Because of its undisputed superiority over all Color Computer word processors, it was selected by Dragon Data Ltd. of England and TANO in the U.S., to be the Official Word Processor for their line of Dragon microcomputers.

The result of two years of research, the VIP Writer™ offers every feature you could desire from a word processor. It is the most powerful, fastest, most dependable and most versatile. With the hi-res display, workspace and compatibility features built into the Library the Writer is also the most usable.

"... Nearly every feature and option possible to implement on the Color Computer. The design of the program is excellent; the programming is flawless... Features for the professional, yet it is easy enough for newcomers to master... Certainly one of the best word processors available for any computer..." October 1983 "Rainbow"

"Word processing with VIP Writer is like driving a high-performance vehicle . . . This Ferarri of a package has more features than Telewriter, Easywriter (for the IBM PC), or Applewriter." October 1983 "Hot CoCo"

The Writer will work with you and your printer to do things you always wanted to do. Every feature of your printer can be put to use, every character set, every graphics capability at any baud rate, EVEN PROPORTIONAL SPACING. All this with simplicity and elegance. You can even automatically print multiple copies.

Although all versions feature tape save and load, the disk version provides the Mini Disk Operating System common to the whole **Library**, plus disk file linking for continous printing.

#### Professional features of particular note:

- Memory-Sense with BANK SWITCHING to fully utilize 64K, giving
- not just 24 or 30K, but up to 61K of workspace with the rompak version and 50K with the disk version.

  TRUE FORMAT WINDOW allowing you to preview the printed page ON THE SCREEN BEFORE PRINTING, showing centered lines, headers, FOOTNOTES, page breaks, page numbers, & margins in line lengths of up to 240 characters. It makes HYPHENATION a snap.

  • A TRUE EDITING WINDOW in all 9 display modes for those extra
- wide reports and graphs (up to 240 columns!)
- wide reports and graphs (up to 240 columns!).

  FREEDOM to imbed any number of PRINTER CONTROL CODES anywhere, EVEN WITHIN JUSTIFIED TEXT.

  Full 4-way cursor control, sophisticated edit commands, the ability to edit any BASIC program or ASCII textfile, SEVEN DELETE FUNCTIONS, LINE INSERT, LOCATE AND CHANGE, wild card locate, up to TEN SIMULTANEOUS block manipulations, word wrap around, programmable tabs, display memory used and left, non-breakable space, and headers, footers and FOOTNOTES.

  Automatic justification, automatic pagination, automatic contering
- Automatic justification, automatic pagination, automatic centering, automatic flush right, underlining, superscripts, subscripts, pause
- print, single-sheet pause, and print comments.

  Type-ahead, typamatic key repeat and key beep for the pros, ERROR DETECTION and UNDO MISTAKE features, 3 PROGRAMMABLE functions, auto column creation, and an instant on-screen HELP TABLE.

32K (Comes with tape & disk) \$59.95

(Includes VIP Speller)

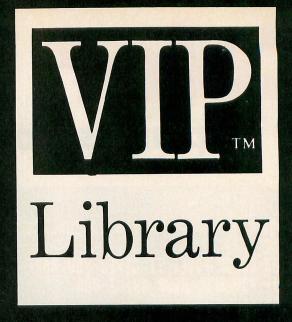
# P Speller™

WITH A 50,000 WORD INDEXED DICTIONARY!

By Bill Argyros

Gone are the eyestrain, boredom and fatigue from endless proof-reading. VIP Speller<sup>™</sup> is the fastest and most user-friendly speller for your CoCo. It can be used to correct any ASCII file — including VIP Library<sup>™</sup> files and files from Scripsit<sup>™</sup> and Telewriter<sup>™</sup>. It automatically checks files for words to be corrected, marked for special attention or even added to the dictionary. You can even view the word in context, with upper and lowercase. VIP Speller™ comes with a specially edited 60,000 word dictionary which, unlike other spellers for the CoCo, is indexed for the greatest speed. The shorter your file, the quicker the checking time. And words can be added to or deleted from the dictionary or you can create one of your own. VIP Speller™ also comes with the Library's mini disk operating system for easy disk manipulation.

32K DISK ONLY \$39.95 Lowercase displays not available with this program.



By Kevin Herrboldt

You can forget the other toy calcs — The real thing is here! No other spreadsheet for the Color Computer gives you:

- 20 ROWS BY 9 COLUMNS ON THE SCREEN AT ONCE
- LOWERCASE LETTERS WITH DESCENDERS
  UP TO 16 CONCURRENT DISPLAY WINDOWS
- **FLOATING-POINT MATH**

Includes

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- US TO 512 COLUMNS BY 1024 ROWS

  USER DEFINABLE WORKSHEET SIZE FOR MORE MEMORY
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  COLUMN/ROW MULTIPLE SORTS
  PROGRAMMABLE FUNCTIONS
  IMBEDDABLE PRINTER CONTROL CODES

- 21 ALTERABLE PRINT FORMAT PARAMETERS
- **ON-LINE HELP TABLES**
- DOES NOT REQUIRE FLEX OR BASIC

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There's nothing left out of **VIP Calc™**. Every feature you've come to rely on with VisiCalc™ is there, and then some. You get up to 5 TIMES the screen display area of other spreadsheets for the Color Computer and Memory-Sense with BANK SWITCHING to give not just 24, or 30, but UP TO 33K OF WORKSPACE IN 64K!!! This display and memory allow you the FULL SIZE, USABLE WORKSHEETS you require. You also get: User definable worksheet size, up to 512 columns by 1024 rows! \*
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Both versions feature Tape save and load, but the disk version also has the Mini Disk Operating System of the entire **Library**.

32K (Comes with tape & disk) \$59.95

32K does have hi-res displays, sort or edit

# **Check These Library Prices:**

- **Fully CoCo 2 Compatible**
- Nine Display Formats: 32 by 16 51, 64, 85 by 21 or 24
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- Four Different Display Colors
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- Memory Sense Bank Switching
- Up to 51K Disk, 53K Tape
- Mini Disk Operating System
- **■** Compatible With All Printers

# VIP Terminaly (Formerly Super "Color" Terminal)

RATED BEST IN JANUARY 1984 "RAINBOW"

By Dan Nelson

From your home or office you can join the communication revolution. The **VIP Terminal** opens the world to you. You can monitor your investments with the Dow Jones Information Service, or broaden your horizons with The Source or Compuserve, bulletin boards, other computers, even the mainframe at work.

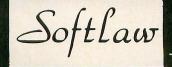
For your important communication needs you've got to go beyond software that only lets you chat. You need a smart termnal so that you can send and receive programs, messages, even other VIP Library<sup>™</sup> files. VIP Terminal<sup>™</sup> has "more features than communications software for CP/M, IBM and CP/M 86 computers." Herb Friedman, Radio Electronics, February 1984.

FEATURES: Choice of 8 hi-res lowercase diplays \* Memory-Sense with BANK SWITCHING for full use of workspace \* Selectively print data at baud rates from 110 to 9600 \* Full 128 character ASCII keyboard \* baud rates from 110 to 9600 \* Full 128 character ASCII keyboard \* Automatic graphic mode \* Word mode (word wrap) for unbroken words \* Send and receive Library files, Machine Language & BASIC programs \* Set communications baud rate from 110 to 9600, Duplex: Half/Full/Echo, Word length: 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 \* Local linefeeds to screen \* Save and load ASCII files, Machine Code & BASIC programs \* Lowercase masking \* 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages \* Programmable prompt or delay for send next line \* Selectable character trapping \* Send up to ten short messages (KSMs), each up to 255 characters long, automatically, to save money when calling long distance. money when calling long distance.

All versions allow tape load and save of files and KSMs, but the disk version also has the Mini Disk Operating System common to the Library.

32K (Comes with tape & disk) \$49.95

(Tape comes in 16K but without hi-res displays)



TRS-80 is a trademark of Tandy Corp. VisiCalc is a trademark of VisiCorp.

**AUTHOR'S SUBMISSIONS** ARE ENCOURAGED.

Circle No. 57 on Reader Service Card

# VIP Database

(Formerly Super "Color" Database)
INCLUDES MAIL MERGE CAPABILITIES TOO! By Tim Nelson

This high speed MACHINE LANGUAGE program fills all your information management needs, be they for your business or home. And it does so better than any other database program for the Color Computer, featuring machine code, lowercase screens and mailmerge capabilities. Inventory, accounts, mailing lists, family histories, you name it, the **VIP Database**\* will keep track of all your data, and it will merge VIP Writer™ files.

The VIP Database™ features the Library Memory Sense with BANK SWITCHING and selectable lowercase displays for maximum utility. It will handle as many records as fit on your disk or disks. It is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending alphabetic or numeric order. Records can be searched for specific entries, using multiple search criteria. With database form merge you may also combine files, sort and print mailing lists, print "boiler plate" documents, address envelopes - the list is endless. The math package even performs arithmetic operations and updates other fields. Create files compatible with the VIP Writer™and VIP Terminal™. Unlimited print format and report generation with the ability to imbed control codes for use with all printers.

As with all other **Library** programs, the **Database** features the powerful Mini Disk Operating System.

32K DISK \$59.95

64K Required for math package & mail merge

**RAVED ABOUT IN THE APRIL 1983 "RAINBOW!"** By Tim Nelson

Your database file disk, form letter disk, or BASIC program disk goes bad. An I/O error stops loading, or even backing up of the disk. Weeks, even months of work sit on the disk, irretrievable. Now catastrophic disk errors are repairable, quickly and with confidence, using the VIP Disk-ZAP<sup>TM</sup>. It is the ultimate repair utility for simple and quick repair of all disk errors. Designed with the non-programmer in mind, the VIP Disk-ZAP<sup>TM</sup> will let you retrieve all types of bashed files, BASIC and Machine Code programs. BASIC and Machine Code programs.

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16K DISK \$49.95 Lowercase displays not available with this program.



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All Disk Programs are also available on 3" Diskettes for the Amdek Color AMDISK-III Micro-Floppy Disk System for an additional \$3.00 each. ©1983 by Softlaw Corporation

```
230 M=179
240 PK=1024
250 REM * For MC-10 change above
line to PK=16384
260 CLSO
270 B$=CHR$(175)
280 O$=CHR$(255)
290 FOR A=1 TO 19
300 A$=A$+B$
310 NEXT
320 FOR X=44 TO 230 STEP 62
330 PRINT @ X,A$;
340 PRINT @ X+256,A$;
350 FOR Z=X TO X+256 STEP 32
360 PRINT @ Z,B$;
370 PRINT @ Z+19,B$;
380 NEXT Z,X
390 PRINT @ M,O$;
400 X$=INKEY$
410 IF X$="*" THEN H=215: GOTO 4
70
420 S=M
430 GOSUB 600
440 PRINT @ S,B$;
450 PRINT @ M,O$;
460 GOTO 400
470 X$=INKEY$
480 S = M
490 GOSUB 600
500 PRINT @ M,O$;
510 PRINT @ 0,H;
520 IF H=0 THEN 690
530 IF S=108 OR S=170 OR S=172 O
R S=315 OR S=317 OR S=379 THEN P
RINT @ S,B$;
540 IF S=236 OR S=234 OR S=232 O
R S=313 OR S=377 OR S=441 THEN P
RINT @ S,B$;
550 IF X\$=D\$ AND PEEK(PK+M-64)=2
55 THEN PRINT @ M-32,0$;
560 IF X\$=U\$ AND PEEK(PK+M+64)=2
55 THEN PRINT @ M+32,0$;
570 IF X$=L$ AND PEEK(PK+M+2)=25
5 THEN PRINT @ M+1,0$;
580 IF X$=R$ AND PEEK(PK+M-2)=25
5 THEN PRINT @ M-1,0$;
590 GOTO 470
600 \text{ U=PEEK(PK+M-32)}
610 D=PEEK(PK+M+32)
620 L=PEEK(PK+M-1)
630 R=PEEK(PK+M+1)
640 IF X$=U$ AND U=175 THEN M=M-
32: H=H-1
650 IF X$=D$ AND D=175 THEN M=M+
32: H=H-1
660 IF X$=L$ AND L=175 THEN M=M-
1: H=H-1
```

```
670 IF X$=R$ AND R=175 THEN M=M+
1: H=H-1
680 RETURN
690 J=1
700 FOR C=131 TO 291 STEP 32
710 PRINT @ C,MID$(Y$,J,1);
720 J=J+1
730 NEXT
740 SOUND 100+RND(10)*10,1
750 GOTO 740
760 END
```

#### (APER OADER

#### Program Listing. Knightly Pursuits



**16K Color Basic** 

```
110 REM * SORCERER'S PUZZLES #7
* RICHARD RAMELLA *
120 CLEAR 500
130 CLS0
140 Z$="WHERE?"
150 U$=CHR$(94)
160 D$=CHR$(10)
170 L$=CHR$(8)
180 R$=CHR$(9)
190 PRINT @ 232, "KNIGHTLY PURSUI
TS";
200 K=0
210 Z=1
220 FOR L=50 TO 0 STEP -15
230 N=N+1
240 IF N/2=INT(N/2) THEN V=8: GO
TO 260
250 V=7
260 GOSUB 660
270 NEXT L
280 FOR T=1 TO 1500
290 NEXT T
300 CLS0
310 FOR Y=0 TO 30 STEP 10
320 FOR X=0 TO 60
330 SET(X,Y,5)
340 NEXT X,Y
350 FOR X=0 TO 60 STEP 20
360 FOR Y=1 TO 29
370 SET(X,Y,5)
380 NEXT Y,X
390 V=7
400 K=2
410 L=6
420 GOSUB 660
430 L=46
440 GOSUB 660
450 V=8
```

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```
1340 GOSUB660
1350 GOTO 540
1360 IF A$<>"SSE" THEN 1460
1370 IF A=42 OR B>2 GOSUB 1790:
GOTO 540
1380 IF POINT(A+27,B+20)<>0 GOSU
B 1790: GOTO 540
1390 O=A
1400 W=B
1410 GOSUB 1840
1420 K=B+20
1430 L=A+24
1440 GOSUB 660
1450 GOTO 540
1460 IF A$<>"EES" THEN 1560
1470 IF A>2 OR B=22 GOSUB 1790:
GOTO 1890
1480 IF POINT(A+49,B+10)<>0 GOSU
B 1790: GOTO 540
1490 O=A
1500 W=B
1510 GOSUB 1840
1520 K=B+10
1530 L = A + 43
1540 GOSUB 660
1550 GOTO 540
1560 IF A$<>"EEN" THEN 1660
1570 IF A>2 OR B=2 GOSUB 1790: G
OTO 540
1580 IF POINT(A+47,B-10)<>0 GOSU
B 1790: GOTO 540
1590 O=A
1600 W=B
1610 GOSUB 1840
1620 K=B-10
1630 L=A+43
1640 GOSUB 660
1650 GOTO 540
1660 IF A$<>"NNE" THEN 1770
1670 IF A=42 OR B<22 GOSUB 1790:
GOTO 540
1680 IF POINT(A+27,B-20)<>0 GOSU
B 1790: GOTO 540
1690 Q=A
1700 W=B
1710 GOSUB 660: GOSUB 1840
1720 K=B-20
1730 L=A+23
1740 GOSUB 660
1750 GOSUB 1790
1760 GOTO 540
1770 P=1
1780 GOTO 930
1790 A$=""
1800 FOR J=31 TO 191 STEP 32
1810 PRINT @ J, CHR$(128);
1820 NEXT J
```

```
1830 RETURN
1840 \text{ V=POINT}(A+7,B)
1850 TY=TY+1
1860 FOR Y=B TO B+7
1870 FOR N=O TO O+15
1880 RESET(N,Y)
1890 NEXT N,Y
1900 RETURN
1910 PRINT @ 225, "WINNER IN"TY"M
OVES.";
1920 IF TY=1+(ASC(U\$)-14)/5 THEN
PRINT @ 257, "LOWEST POSSIBLE SC
ORE": GOTO 1920
1930 PRINT @ 257, "YOU CAN DO BET
TER, THOUGH...";: GOTO 1930
1940 END
```

TAPER

16K Extended Color Basic



#### Program Listing. The Diagons

```
110 REM * SORCERER'S PUZZLES #7
* RICHARD RAMELLA *
120 CLS
130 CLEAR 100
140 PRINT @ 234, "THE DIAGONS";
150 FOR T=1 TO 30
160 SOUND RND(8)*13,1
170 NEXT
180 CLS0
190 PCLEAR 4
200 PMODE 3,1
210 PCLS1
220 DIM C(10,10),D(10,10),E(10,1
0),F(20)
230 U$=CHR$(94)
240 D$=CHR$(10)
250 L$=CHR$(8)
260 R$=CHR$(9)
270 GET(10,7)-(23,23),C
280 CIRCLE(16,16),9,3
290 PAINT(16,16),3,3
300 GET(10,7)-(26,25),D
310 PUT(8,7)-(26,25),C
320 CIRCLE(16,16),9,4
330 PAINT(16,16),4,4
340 \text{ GET}(10,7)-(26,25), E
350 PUT(8,7)-(26,25),C
360 SCREEN1,1
370 FOR X=0 TO 128 STEP 32
380 LINE(0,X)-(128,X), PSET
390 LINE(X,0)-(X,160), PSET
400 NEXT X
410 LINE(0,X)-(128,X),PSET
420 Y=7
```



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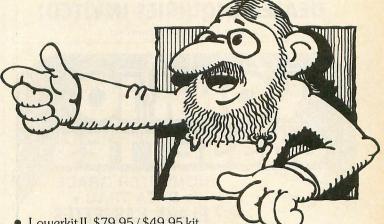
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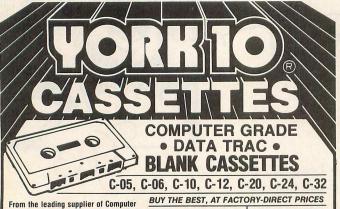
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430 FOR X=8 TO 104 STEP 32 440 SOUND X+Y,1 450 PUT(X,Y)-(X+19,Y+18),D460 SOUND X+Y,1 470 PUT(X,Y+128)-(X+19,Y+146),E 480 NEXT 490 X=16 500 Y = 16510 CIRCLE(X,Y),4,2 520 A\$=INKEY\$ 530 IF A\$= " THEN 520 540 IF A\$>"0" AND A\$<"4" THEN L= VAL(A\$): GOTO 520 550 V=X 560 W=Y 570 IF A\$=U\$ AND Y>16 THEN Y=Y-3 2 580 IF A\$=D\$ AND Y<144 THEN Y=Y+ 32 590 IF A\$=L\$ AND X>16 THEN X=X-3 2 600 IF A\$=R\$ AND X<112 THEN X=X+ 32 610 CIRCLE(V,W), 4, PPOINT(V,W) 620 CIRCLE(X,Y),4,2 630 G=PPOINT(X,Y)640 S=PPOINT(X,Y) 650 IF S<>7 AND S<>8 THEN 520 660 IF L=0 THEN 520 670 L=L-1680 IF X=16 OR Y=16 THEN 690 ELS E IF PPOINT(x-32,y-32)<>5 THEN 6 90 ELSE IF A\$="A" THEN V=X-36: W =Y-41: GOSUB 740690 IF X=112 OR Y=16 THEN 700 EL SE IF PPOINT(X+32,Y-32)<>5 THEN 700 ELSE IF A\$="S" THEN V=X+28: W=Y-41: GOSUB 740 700 IF X=16 OR Y=144 THEN 710 EL SE IF PPOINT(X-32,Y+32)<>5 THEN 710 ELSE IF A\$="Z" THEN V=X-36: W=Y+23: GOSUB 740 710 IF X=112 OR Y=144 THEN 720 E LSE IF PPOINT(X+32,Y+32)<>5 THEN 720 ELSE IF A\$="X" THEN V=X+28: W=Y+23: GOSUB 740 720 IF L>0 THEN 620 730 GOTO 520 740 PUT(X-6,Y-8)-(X+13,Y+9), C 750 IF G=8 THEN PUT(V,W)-(V+18,W+18), E ELSE PUT(V,W)-(V+18,W+18) , D 760 SOUND X+Y-10,1770 IF A\$="A" THEN X=X-32: Y=Y-3 780 IF A\$="S" THEN X=X+32: Y=Y-3 2

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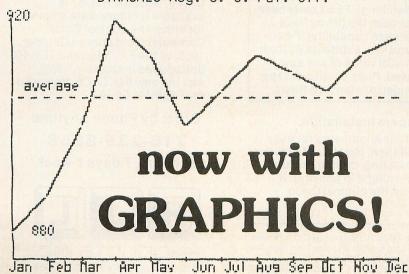


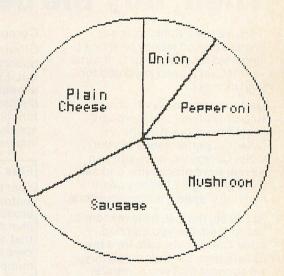
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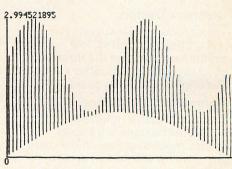
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```
790 IF A$="Z" THEN X=X-32: Y=Y+3
800 IF A$="X" THEN X=X+32: Y=Y+3
2
810 CIRCLE(X,Y),4,2
820 IF L>0 THEN RETURN
830 J=1
840 FOR Q=16 TO 144 STEP 32
850 FOR R=16 TO 112 STEP 32
860 U=PPOINT(R,Q)
870 IF U=7 THEN F(J)=1 ELSE IF U
=8 THEN F(J)=2 ELSE F(J)=0
880 J=J+1
890 NEXT R,Q
900 IF F(1)+F(2)+F(3)+F(4)=8 AND
 F(17)+F(18)+F(19)+F(20)=4 THEN
1230
910 K=F(3)+F(8)
920 GOSUB 1160
930 K=F(2)+F(7)+F(12)
940 GOSUB 1160
950 K=F(1)+F(6)+F(11)+F(16)
960 GOSUB 1160
970 K=F(5)+F(10)+F(15)+F(20)
980 GOSUB 1160
990 K=F(9)+F(14)+F(19)
1000 GOSUB 1160
1010 \text{ K}=\text{F}(13)+\text{F}(18)
1020 GOSUB 1160
1030 \text{ K}=\text{F}(2)+\text{F}(5)
1040 GOSUB 1160
1050 \text{ K}=\text{F}(3)+\text{F}(6)+\text{F}(9)
1060 GOSUB 1160
1070 \text{ K}=\text{F}(4)+\text{F}(7)+\text{F}(10)+\text{F}(13)
1080 GOSUB 1160
1090 \text{ K} = \text{F}(8) + \text{F}(11) + \text{F}(14) + \text{F}(17)
1100 GOSUB 1160
1110 \text{ K}=\text{F}(12)+\text{F}(15)+\text{F}(18)
1120 GOSUB 1160
1130 \text{ K}=\text{F}(16)+\text{F}(19)
1140 GOSUB 1160
1150 RETURN
1160 IF K>2 AND K/2 <> INT(K/2) TH
EN 1170 ELSE RETURN
1170 PRINT@RND(63)*8,"LOSER !";
1180 SOUND 5,10
1190 SCREEN1,1
1200 SOUND 45,5
1210 SOUND 89,5
1220 GOTO 1170
1230 PRINT@RND(63)*8, "WINNER!";
1240 SOUND RND(100)+125,5
1250 SCREEN 1,1
1260 SOUND RND(100)+100,8
1270 GOTO 1230
1280 END
```

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Screen Format: 80 x 25 w/true upper & lower case.

Select half, full duplex or echo.

Select odd, even, mark, space or no parity. Send all 128 characters from keyboard. Select 7 or 8 bit words. Select 1 or 2 stop bits. Send a true line break. Select all caps if needed. Automatic capture of incoming files. X on/X off capabilities. Merge text or programs in buffer. 53,000 character buffer (64K). Split buffer option (64K). 10 macro keys.

Four buffer send modes (dump, prompted, manual & time delay). Buffer size indicators (bytes used & bytes remaining).

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Selectable printer formats (line feeds,

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Buffer editor has these features: Move forward and reverse through buffer. Insert, type over, delete lines or characters.

Block deletion or start to end of buffer delete

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Use 1-4 disk drive (w/SAVE, LOAD, DIR. & granule display).

Easy to use MENU driven format. Comprehensive users manual.

Works with ALL Radio ShackTM Disk Systems and all models of color

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As with all good Professional programs, Ultra Term + is all machine code. This program has been tested by those both familiar and unfamiliar with communications programs. And when you call for some technical support, you won't get an answering machine during our business hours (10-5 CST M-Sat.) under normal circumstances. Technical help is usually available all day.

Note: Color Term + PLUS + should have all of the same capabilities described above by the time you read this ad, but call first to make sure. Ultra Term + is ready to ship now.

PRICE: Ultra Term + - \$55.95 (Disk/Tape)

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Word · Pak (Includes a software driver so you can use your basic programs with no modification in most cases!)...\$139.95 + \$3.00 S&H

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Complete Package Ultra Term + Word Pak & Y Cable [subtract \$20.00 if not needed] is only \$210.00

\*Ultra Term + supports the 80 column board made by PBJ, Inc. If you already have the board, simply order the program, but those of you who don't can get a good deal.

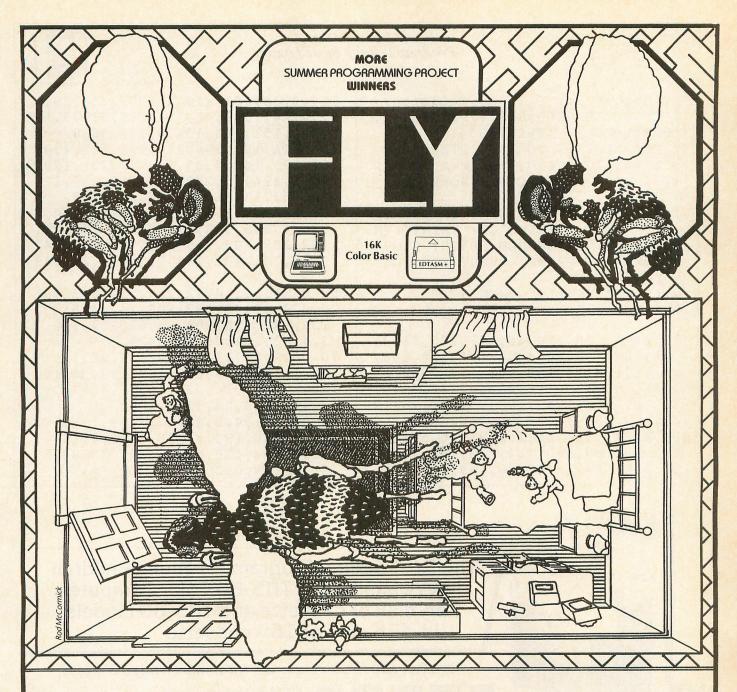
\*\*Parallel Printer Port from PBJ, Inc. †Less \$10.00 restocking charge.

\*Canadians\* Kelly Software Distributors Ltd. P.O. Box 11932 Edmonton, Alberta. (403) 421-8003



Double Denzity Software 920 Baldwin Street Denton, Texas 76201 Phone 817/566-2004.





LY, BY RONALD BOULANGER, is the first runner up in the assembly language category of 1983's Summer Programming Project. "Fly" is fast, and will soon have your head buzzing. Here's the author's description, and directions:

The object of the game is to catch as many flies as you can in three minutes. Each fly caught creates an obstacle. Be careful, you may be trapped by those obstacles. The more flies you catch, the tougher the game becomes. Each fly caught gives you one point.

Type CSAVE and Run the Basic loader. Entering Y to the ARE YOU READY? prompt will run the game. Pressing Break will return you to Basic so you can prepare a tape; type CSAVEM "FLY", 8192,8895,8192 to save the shorter machine code.

On top of the screen, the score board is shown. From left to right is the actual score (sc); the high score (hs); and the time (three minutes to begin). The bottom of the screen is the prompt: SELECT SPEED (1 – 9). The lower the number you press, the faster the game will be.

At this point, only keys 1 to 9 and the Break key are operating. The Break key will initiate a new game.

The game is played with the cursor control keys (arrow keys) up, down, left, right. Once the speed has been selected, the game starts. The blue dot is the fly,

controlled by the computer. The white dot is controlled by the player using the arrow keys. To score points, touch the blue dot with a white dot. Once you touch the fly it will freeze and you will hear a tone. This will create an obstacle and give you one point.

If you or the fly are trapped between obstacles, depress letter  $\tau$  for trap; this will stop the game and check for a new high score.

To play again, just select a speed. You can change speed any time in the game by depressing the letter s (for select). This will freeze the time left; once your speed selection has been made, the game continues where it stopped.

#### Program Listing. Basic Loader



16K Color Basic

O 'Loader for FLY, R. Boulanger 1 CLS: CLEAR200,8191: PRINT@204, "FLY LOADER": PRINT@384 2 FOR AD=8192 TO 8895 STEP 32 3 LN=LN+10: CK=0: FOR M=AD TO AD +31: READ D: CK=CK+D: POKE M,D: NEXT M 4 READ CH: IF CH<>CK THEN PRINT"

DATA TYPO IN LINE"LN: PRINT" CH ECKSUM OF "CK" SHOULD BE "CH: STOP 5 NEXT AD: PRINT" READY FOR FLY? (Y/N/BREAK)"

6 IF INKEY\$<>"Y" THEN 6 7 EXEC 8192

10 DATA 158,116,48,137,255,56,31 ,20,189,169,40,48,141,2,128,206, 4,161,198,29,189,165,154,189,169 ,162,189,169,118,204,48,48,3940 20 DATA 221,242,198,255,79,151,2 41,183,255,32,74,38,250,31,152,9 0,38,245,48,141,2,118,206,5,165, 198,18,189,165,154,223,136,4543 30 DATA 141,2,32,20,189,161,177,

129,3,39,181,129,48,35,245,129,5 7,34,241,128,48,151,195,57,79,15 1,194,151,240,134,9,151,3680 40 DATA 193,204,255,128,142,4,0, 167,128,140,4,33,38,249,231,128, 140,5,224,38,249,198,255,237,129 ,140,5,255,35,249,48,31,4282 50 DATA 48,136,224,237,132,140,4 ,32,34,246,198,175,142,4,240,231 ,132,159,208,215,210,198,159,142 ,4,80,231,132,159,211,215,213,48 60 DATA 142,4,22,204,51,58,237,1 29,204,48,48,237,132,142,4,5,237 ,132,142,4,3,204,83,67,237,132,1 42,4,13,204,72,83,3426 70 DATA 237,132,220,242,253,4,15 ,23,1,169,132,255,129,193,36,16, 129,129,36,16,129,65,36,4,134,10 ,32,10,134,94,32,6,3053 80 DATA 134,8,32,2,134,9,151,192 ,23,1,136,132,6,139,3,52,2,141,1 7,150,194,129,68,16,39,255,93,53 ,2,74,129,0,2516



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· Compare Shapes



90

90 DATA 38,237,32,195,182,1,19,1 29,59,35,51,134,0,183,1,19,182,4 ,25,74,183,4,25,129,47,38,35,134 ,57,183,4,25,2464 100 DATA 182,4,24,74,183,4,24,12 9,47,38,19,134,53,183,4,24,182,4 ,22,74,183,4,22,129,47,38,3,22,0 ,242,222,195,2515 110 DATA 51,95,17,131,0,0,38,248 ,214,210,158,208,150,192,141,76, 159,208,215,210,158,211,214,213, 189,161,193,129,84,16,39,0,4328 120 DATA 223,129,83,38,40,52,54, 141,2,32,18,206,5,230,48,141,1,5 8,198,18,189,165,154,223,136,23, 254,200,57,134,255,222,3729 130 DATA 136,167,196,51,95,17,13 1,5,229,38,246,53,54,129,0,39,2, 151,193,150,193,141,5,159,211,21 5,213,57,129,8,38,6,3457 140 DATA 31,18,48,31,32,30,129,9 ,38,6,31,18,48,1,32,20,129,94,38 ,7,31,18,48,136,224,32,9,129,10, 38,58,31,1554 150 DATA 18,48,136,32,141,1,57,1 66,132,129,128,39,5,231,164,141, 6,57,231,132,167,164,57,129,255, 38,3,31,33,57,129,159,3216

160 DATA 38,116,52,54,23,0,120,5 3,54,134,255,167,164,166,63,129, 128, 38, 7, 49, 63, 167, 164, 31, 33, 57, 166,33,129,128,38,4,2823 170 DATA 49,33,32,241,166,168,22 4,129,128,38,5,49,168,224,32,229 ,166,168,32,129,128,38,226,49,16 8,32,32,217,142,4,5,236,3687 180 DATA 132,92,193,58,39,4,237, 132,32,5,198,48,76,237,132,57,14 2,4,22,204,48,58,237,129,198,48, 237,132,134,68,151,194,3678 190 DATA 150,240,145,241,35,10,1 51,241,252,4,5,221,242,253,4,15, 189,33,107,22,254,2,31,33,129,17 5,16,39,255,132,57,189,3872 200 DATA 169,118,198,21,134,255, 183,255,32,74,38,250,90,38,245,1 2,240,32,169,134,0,71,142,1,22,1 98,3,166,133,90,169,133,3815 210 DATA 167,133,90,42,249,198,3 ,108,133,38,3,90,42,249,57,82,79 ,78,65,76,68,96,66,79,85,76,65,7 8,71,69,82,96,2913 220 DATA 80,82,69,83,69,78,84,83 ,96,70,76,89,83,69,76,69,67,84,9 6,83,80,69,69,68,96,40,49,45,57, 41,255,53,2508

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|  |   |                                 | Program L                                  | isting. Fly!   |  |                                  |   |
| A1C1<br>A1B1<br>A976   | 00001 POLCAT<br>00002 POLKEY<br>00003 AUDON           | EQU<br>EQU                      | \$A1C1<br>\$A1B1<br>\$A976                 | 20B0 ED 84<br>20B2 8E 0403<br>20B5 CC 5343<br>20B8 ED 00                 | 00085<br>00086<br>00087<br>00088                   | STD<br>LDX<br>LDD<br>STD         | ,X<br>#\$403<br>#\$5343<br>0,X                |
| A9A2<br>A59A<br>A928   | 00004 SELMUX<br>00005 TXTMOV<br>00006 CLSCRN<br>00007 | EQU<br>EQU                      | \$A9A2<br>\$A59A<br>\$A928                 | 20BA 8E 040D<br>20BD CC 4853<br>20C0 ED 00                               | 00089<br>00090<br>00091                            | LDX<br>LDD<br>STD                | #\$40D<br>#\$4853<br>0,X                      |
| 2000<br>2000 9E 74<br>2002 30 89 FF38<br>2006 1F 14                    | 00008<br>00009 INIT<br>00010<br>00011                 | ORG<br>LDX<br>LEAX<br>TFR       | \$2000<br>\$74<br>\$FF38,X<br>X,S          | 20C2 DC F2<br>20C4 FD 040F<br>20C7 17 01A9<br>20CA 84 FF                 | 00092<br>00093<br>00094 CPUDIR<br>00095            | LDD<br>STD<br>LBSR<br>ANDA       | \$F2 .<br>\$40F<br>RND<br>#\$FF               |
| 2008 BD A928<br>200B 30 8D 0280<br>200F CE 04A1<br>2012 C6 1D          | 00012<br>00013<br>00014<br>00015                      | JSR<br>LEAX<br>LDU<br>LDB       | CLSCRN<br>MESG,PCR<br>#\$4A1<br>#\$1D      | 20CC 81 C1<br>20CE 24 10<br>20D0 81 81<br>20D2 24 10                     | 00096<br>00097<br>00098<br>00099                   | CMPA<br>BHS<br>CMPA<br>BHS       | #193<br>CURLFT<br>#129<br>CURRGT              |
| 2014 BD A59A<br>2017 BD A9A2<br>201A BD A976<br>201D CC 3030           | 00016<br>00017<br>00018<br>00019                      | JSR<br>JSR<br>JSR<br>LDD        | TXTMOV<br>SELMUX<br>AUDON<br>#\$3030       | 20D4 81 41<br>20D6 24 04<br>20D8 86 0A<br>20DA 20 0A                     | 00100<br>00101<br>00102 CURDN<br>00103             | CMPA<br>BHS<br>LDA<br>BRA        | #65<br>CURUP<br>#\$0A<br>DIR                  |
| 2020 DD F2<br>2022 C6 FF<br>2024 4F<br>2025 97 F1                      | 00020<br>00021<br>00022<br>00023                      | STD<br>LDB<br>CLRA<br>STA       | \$F2<br>#\$FF<br>\$F1                      | 20DC 86 5E<br>20DE 20 06<br>20E0 86 08<br>20E2 20 02                     | 00104 CURUP<br>00105<br>00106 CURLFT<br>00107      | LDA<br>BRA<br>LDA<br>BRA         | #\$5E<br>DIR<br>#\$08<br>DIR                  |
| 2027 B7 FF20<br>202A 4A<br>202B 26 FA<br>202D 1F 98                    | 00024 OUV<br>00025<br>00026<br>00027                  | STA<br>DECA<br>BNE<br>TFR       | SFF20<br>OUV<br>B,A                        | 20E4 86 09<br>20E6 97 C0<br>20E8 17 0188<br>20EB 84 06                   | 00108 CURRGT<br>00109 DIR<br>00110 DIRECT<br>00111 | LDA<br>STA<br>LBSR<br>ANDA       | #\$09<br>\$C0<br>RND<br>#\$06                 |
| 202F 5A<br>2030 26 F5<br>2032 30 8D 0276<br>2036 CE 05A5               | 00028<br>00029<br>00030<br>00031                      | DECB<br>BNE<br>LEAX<br>LDU      | OUV<br>SEL,PCR<br>#\$5A5                   | 20ED 8B 03<br>20EF 34 02<br>20F1 8D 11<br>20F3 96 C2                     | 00112<br>00113 NEXT<br>00114<br>00115              | ADDA<br>PSHS<br>BSR<br>LDA       | #\$03<br>A<br>MAIN<br>\$C2                    |
| 2039 C6 12<br>203B BD A59A<br>203E DF 88<br>2040 8D 02                 | 00032<br>00033<br>00034<br>00035                      | LDB<br>JSR<br>STU<br>BSR        | #\$12<br>TXTMOV<br>\$88<br>POLL            | 20F5 81 44<br>20F7 1027 FF5D<br>20FB 35 02<br>20FD 4A                    | 00116<br>00117<br>00118 DEC<br>00119               | CMPA<br>LBEQ<br>PULS<br>DECA     | #\$44<br>BEGIN<br>A                           |
| 2042 20 14<br>2044 BD AlB1<br>2047 81 03<br>2049 27 B5                 | 00036<br>00037 POLL<br>00038<br>00039                 | BRA<br>JSR<br>CMPA<br>BEQ       | BEGIN<br>POLKEY<br>#\$03<br>INIT           | 20FE 81 00<br>2100 26 ED<br>2102 20 C3<br>2104 B6 0113                   | 00120<br>00121<br>00122<br>00123 MAIN              | CMPA<br>BNE<br>BRA<br>LDA        | #\$00<br>NEXT<br>CPUDIR<br>\$0113             |
| 204B 81 30<br>204D 23 F5<br>204F 81 39<br>2051 22 F1                   | 00040<br>00041<br>00042<br>00043                      | CMPA<br>BLS<br>CMPA<br>BHI      | #\$30<br>POLL<br>#\$39<br>POLL             | 2107 81 3B<br>2109 23 33<br>210B 86 00<br>210D B7 0113                   | 00124<br>00125<br>00126<br>00127                   | CMPA<br>BLS<br>LDA<br>STA        | #\$3B<br>TIME<br>#\$00<br>\$0113              |
| 2053 80 30<br>2055 97 C3<br>2057 39<br>2058 4F                         | 00044<br>00045<br>00046<br>00047 BEGIN                | SUBA<br>STA<br>RTS<br>CLRA      | #\$30<br>\$C3                              | 2110 B6 0419<br>2113 4A<br>2114 B7 0419<br>2117 81 2F                    | 00128<br>00129<br>00130<br>00131                   | LDA<br>DECA<br>STA<br>CMPA       | \$0419<br>\$0419<br>#\$2F                     |
| 2059 97 C2<br>205B 97 F0<br>205D 86 09<br>205F 97 C1                   | 00048<br>00049<br>00050<br>00051                      | STA<br>STA<br>LDA<br>STA        | \$C2<br>\$F0<br>#\$09<br>\$C1              | 2119 26 23<br>211B 86 39<br>211D B7 0419<br>2120 B6 0418                 | 00132<br>00133<br>00134<br>00135                   | BNE<br>LDA<br>STA<br>LDA         | TIME<br>#\$39<br>\$0419<br>\$0418             |
| 2061 CC FF80<br>2064 8E 0400<br>2067 A7 80<br>2069 8C 0421             | 00052<br>00053<br>00054 UP<br>00055                   | LDD<br>LDX<br>STA<br>CMPX       | #\$FF80<br>#\$0400<br>,X+<br>#\$0421       | 2123 4A<br>2124 B7 0418<br>2127 81 2F<br>2129 26 13                      | 00136<br>00137<br>00138<br>00139                   | DECA<br>STA<br>CMPA<br>BNE       | \$0418<br>#\$2F<br>TIME                       |
| 206C 26 F9<br>206E E7 80<br>2070 8C 05E0<br>2073 26 F9                 | 00056<br>00057 CLS<br>00058<br>00059                  | BNE<br>STB<br>CMPX<br>BNE       | UP<br>,X+<br>#\$05E0<br>CLS                | 212B 86 35<br>212D B7 0418<br>2130 B6 0416<br>2133 4A                    | 00140<br>00141<br>00142<br>00143                   | LDA<br>STA<br>LDA<br>DECA        | #\$35<br>\$0418<br>\$0416                     |
| 2075 C6 FF<br>2077 ED 81<br>2079 8C 05FF<br>207C 23 F9                 | 00060<br>00061 DOWN<br>00062<br>00063                 | LDB<br>STD<br>CMPX<br>BLS       | #\$FF<br>,X++<br>#\$5FF<br>DOWN            | 2134 B7 0416<br>2137 81 2F<br>2139 26 03<br>213B 16 00F2                 | 00144<br>00145<br>00146<br>00147                   | STA<br>CMPA<br>BNE<br>LBRA       | \$0416 ~<br>#\$2F<br>TIME<br>TIMEO            |
| 207E 30 1F<br>2080 30 88 E0<br>2083 ED 84<br>2085 8C 0420              | 00064<br>00065 SIDE<br>00066<br>00067                 | LEAX<br>LEAX<br>STD<br>CMPX     | -1,X<br>-32,X<br>,X<br>#\$420              | 213E DE C3<br>2140 33 5F<br>2142 1183 0000<br>2146 26 F8                 | 00148 TIME<br>00149 DELAY<br>00150<br>00151        | LDU<br>LEAU<br>CMPU<br>BNE       | \$C3<br>-01,U<br>#\$0000<br>DELAY             |
| 2088 22 F6<br>208A C6 AF<br>208C 8E 04F0<br>208F E7 84                 | 00068<br>00069<br>00070<br>00071                      | BHI<br>LDB<br>LDX<br>STB        | SIDE<br>#\$AF<br>#\$4F0                    | 2148 D6 D2<br>214A 9E D0<br>214C 96 C0<br>214E 8D 4C                     | 00152<br>00153<br>00154<br>00155                   | LDB<br>LDX<br>LDA<br>BSR         | \$D2<br>\$D0<br>\$C0<br>CPUMOV                |
| 2091 9F D0<br>2093 D7 D2<br>2095 C6 9F<br>2097 8E 0450                 | 00072<br>00073<br>00074<br>00075                      | STX<br>STB<br>LDB<br>LDX        | \$D0<br>\$D2<br>#\$9F<br>#\$450            | 2150 9F D0<br>2152 D7 D2<br>2154 9E D3<br>2156 D6 D5                     | 00156<br>00157<br>00158<br>00159                   | STX<br>STB<br>LDX<br>LDB         | \$D0<br>\$D2<br>\$D3<br>\$D5                  |
| 209A E7 84<br>209C 9F D3<br>209E D7 D5<br>20A0 8E 0416<br>20A3 CC 333A | 00076<br>00077<br>00078<br>00079<br>00080             | STB<br>STX<br>STB<br>LDX        | ,X<br>\$D3<br>\$D5<br>#\$416<br>#\$333A    | 2158 BD AlC1<br>215B 81 54<br>215D 1027 00DF<br>2161 81 53<br>2163 26 28 | 00160<br>00161<br>00162<br>00163                   | JSR<br>CMPA<br>LBEQ<br>CMPA      | POLCAT<br>#\$54<br>HIGHS<br>#\$53             |
| 20A6 ED 81<br>20A8 CC 3030<br>20AB ED 84<br>20AD 8E 0405               | 00080<br>00081<br>00082<br>00083<br>00084             | LDD<br>STD<br>LDD<br>STD<br>LDX | #\$333A<br>,X++<br>#\$3030<br>,X<br>#\$405 | 2163 26 28<br>2165 34 36<br>2167 8D 02<br>2169 20 12<br>216B CE 05E6     | 00164<br>00165<br>00166<br>00167<br>00168 PRTSEL   | BNE<br>PSHS<br>BSR<br>BRA<br>LDU | COMPA<br>A,B,X,Y<br>PRTSEL<br>ERASE<br>#\$5E6 |

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| 216E 30                 | 8D 013A                             | 00169                 | LEAX           | SEL, PCR          |              | 2210 A6            | A8 :         | 20 00              | 248 S                | PACE2                  | LDA                             | \$20,Y          |              |
| 2172 C6                 | 12                                  | 00170                 | LDB            | #\$12             |              | 2213 81            | 80           |                    | 249                  |                        | CMPA                            | #\$80           |              |
| 2174 BD                 | A928                                | 00171                 | JSR            | TXTMOV            |              | 2215 26            | E2           |                    | 250                  |                        | BNE                             | RTN             |              |
| 2177 DF                 | 88                                  | 00172                 | STU            | \$88              |              | 2217 31<br>221A 20 | A8<br>D9     |                    | 251<br>252           |                        | LEAY                            | \$20,Y          |              |
| 2179 17<br>217C 39      | FEC8                                | 00173<br>00174        | LBSR<br>RTS    | POLL              |              | 221C 8E            | 040          |                    | 253 S                |                        | BRA<br>LDX                      | SWAP<br>#\$0405 |              |
| 217D 86                 | FF                                  | 00175 ERASE           | LDA            | #\$FF             |              | 221F EC            | 00           |                    | 254                  |                        | LDD                             | 0,X             |              |
| 217F DE                 | 88                                  | 00176                 | LDU            | \$88              |              | 2221 5C            |              |                    | 255                  |                        | INCB                            |                 |              |
| 2181 A7                 | 40                                  | 00177 BACKSP          | STA            | 0,0               |              | 2222 Cl            | 3A<br>04     |                    | 256                  |                        | CMPB                            | #\$3A           |              |
| 2183 33<br>2185 11      | 5F                                  | 00178<br>00179        | LEAU<br>CMPU   | -1,U<br>#\$5E5    |              | 2224 27<br>2226 ED | 00           |                    | 257<br>258           |                        | BEQ                             | RESETO<br>0,X   |              |
| 2189 26                 | F6                                  | 00180                 | BNE            | BACKSP            |              | 2228 20            | 05           |                    | 259                  |                        | BRA                             | COUNTI          |              |
| 218B 35                 | 36                                  | 00181                 | PULS           | A,B,X,Y           |              | 222A C6            | 30           |                    |                      | ESET0                  | LDB                             | #\$30           |              |
| 218D 81                 | 00                                  | 00182 COMPA           | CMPA           | #\$00             |              | 222C 4C<br>222D ED | 0.0          |                    | 261                  |                        | INCA                            | 0 4             |              |
| 218F 27                 | 02                                  | 00183                 | BEQ            | PLYDIR            |              | 222D ED<br>222F 39 | 00           |                    | 262<br>263 C         | COUNTI                 | STD<br>RTS                      | 0,X             |              |
| 2191 97<br>2193 96      | C1<br>C1                            | 00184<br>00185 PLYDIR | STA<br>LDA     | \$C1<br>\$C1      |              | 2230 8E            | 041          |                    | 264 T                |                        | LDX                             | #\$0416         |              |
| 2195 8D                 | 05                                  | 00186                 | BSR            | CPUMOV            |              | 2233 CC            | 303          |                    | 265                  |                        | LDD                             | #\$303A         |              |
| 2197 9F                 | D3                                  | 00187                 | STX            | \$D3              |              | 2236 ED            | 81           |                    | 266                  |                        | STD                             | ,X++            |              |
| 2199 D7                 | D5                                  | 00188                 | STB            | \$D5              |              | 2238 C6<br>223A ED | 30           |                    | 267<br>268           |                        | LDB<br>STD                      | #\$30           |              |
| 219B 39<br>219C 81      | 08                                  | 00189                 | RTS            | #000              |              | 223C 86            | 44           |                    | 269                  |                        | LDA                             | 0,X<br>#\$44    |              |
| 219E 26                 | 06                                  | 00190 CPUMOV<br>00191 | CMPA<br>BNE    | #\$08<br>CPURGT   |              | 223E 97            | C2           |                    | 270                  |                        | STA                             | \$C2            |              |
| 21A0 1F                 | 12                                  | 00192                 | TFR            | X,Y               |              | 2240 96            | FO           |                    | 271 H                | IIGHS                  | LDA                             | \$F0            |              |
| 21A2 30                 | 1F                                  | 00193                 | LEAX           | -01,X             |              | 2242 91            | F1           |                    | 272                  |                        | CMPA                            | \$F1            |              |
| 21A4 20                 | 1E                                  | 00194                 | BRA            | CHK1              | No.          | 2244 23<br>2246 97 | OA<br>F1     |                    | 273<br>274           |                        | BLS<br>STA                      | RETRY<br>\$F1   |              |
| 21A6 81<br>21A8 26      | 09                                  | 00195 CPURGT<br>00196 | CMPA<br>BNE    | #\$09<br>CPUUP    |              | 2248 FC            | 040          |                    | 275                  |                        | LDD                             | \$405           |              |
| 21AA 1F                 | 12                                  | 00196                 | TFR            | X,Y               |              | 224B DD            | F2           |                    | 276                  |                        | STD                             | \$F2            |              |
| 21AC 30                 | 01                                  | 00198                 | LEAX           | 01,X              |              | 224D FD            | 040          | F 00               | 277                  |                        | STD                             | \$40F           |              |
| 21AE 20                 | 14                                  | 00199                 | BRA            | CHK1              |              | 2250 BD            | 216          |                    | 278 R                | RETRY                  | JSR                             | PRTSEL          |              |
| 21B0 81                 | 5E                                  | 00200 CPUUP           | CMPA           | #\$5E             |              | 2253 16<br>2256 1F | FE0<br>21    |                    | 279                  | ІТСНК                  | LBRA<br>TFR                     | BEGIN           |              |
| 21B2 26<br>21B4 1F      | 07<br>12                            | 00201<br>00202        | BNE            | CPUDN<br>X,Y      |              | 2258 81            | AF           |                    | 281                  | ITICHK                 | CMPA                            | Y,X<br>#\$AF    |              |
| 21B6 30                 | 88 E0                               | 00203                 | LEAX           | -\$20,X           | City Charles | 225A 102           |              |                    | 282                  |                        | LBEQ                            | HIT             |              |
| 21B9 20                 | 09                                  | 00204                 | BRA            | CHK1              |              | 225E 39            |              |                    | 283                  |                        | RTS                             |                 |              |
| 21BB 81                 | 0 A                                 | 00205 CPUDN           | CMPA           | #\$0A             |              | 225F BD            | A97          |                    | 284 S                | OUND                   | JSR                             | AUDON           |              |
| 21BD 26                 | 3A                                  | 00206                 | BNE            | RTN               | CAT IN       | 2262 C6<br>2264 86 | 15<br>FF     |                    | 285<br>286 L         | ENTH                   | LDB                             | #\$15<br>#\$FF  |              |
| 21BF 1F<br>21C1 30      | 12<br>88 20                         | 00207                 | TFR<br>LEAX    | X,Y<br>\$20,X     |              | 2266 B7            | FF2          |                    | 287 T                |                        | STA                             | \$FF20          |              |
| 21C4 8D                 | 01                                  | 00209 CHK1            | BSR            | CHCK              |              | 2269 4A            |              |                    | 288                  |                        | DECA                            |                 |              |
| 21C6 39                 |                                     | 00210                 | RTS            |                   |              | 226A 26            | FA           |                    | 289                  |                        | BNE                             | TONE            |              |
| 21C7 A6                 | 00                                  | 00211 CHCK            | LDA            | 0,X               |              | 226C 5A            | 75           |                    | 290                  |                        | DECB                            |                 |              |
| 2109 81                 | 80                                  | 00212                 | CMPA           | #\$80             |              | 226D 26<br>226F 0C | F5<br>F0     |                    | 291<br>292           |                        | BNE                             | LENTH<br>\$FO   |              |
| 21CB 27<br>21CD E7      | 05<br>20                            | 00213<br>00214        | BEQ<br>STB     | EXCH<br>0,Y       |              | 2271 20            | A9           |                    | 293                  |                        | BRA                             | SCORE           |              |
| 21CF 8D                 | 06                                  | 00214                 | BSR            | CKSIDE            |              | 2273 86            | 00           |                    | 294 R                | RND                    | LDA                             | #0              |              |
| 21D1 39                 |                                     | 00216                 | RTS            |                   |              | 2275 47            |              |                    | 295                  |                        | ASRA                            |                 |              |
| 21D2 E7                 | 00                                  | 00217 EXCH            | STB            | 0,X               | Total or     | 2276 8E            | 011          |                    | 296                  |                        | LDX                             | #\$116          |              |
| 21D4 A7                 | 20                                  | 00218                 | STA            | 0,Y               |              | 2279 C6<br>227B A6 | 03<br>85     |                    | 297<br>298           |                        | LDB<br>LDA                      | #\$03<br>B,X    |              |
| 21D6 39<br>21D7 81      | FF                                  | 00219<br>00220 CKSIDE | RTS<br>CMPA    | #\$FF             | 1000         | 227D 5A            |              |                    | 299                  |                        | DECB                            | D,A             |              |
| 21D9 26                 | 03                                  | 00221                 | BNE            | OPPONT            |              | 227E A9            | 85           |                    | 300 L                |                        | ADCA                            | B,X             | 100          |
| 21DB 1F                 | 21                                  | 00222 TFR             | TFR            | Y,X               |              | 2280 A7            | 85           |                    | 301                  |                        | STA                             | B,X             |              |
| 21DD 39                 |                                     | 00223                 | RTS            |                   |              | 2282 5A            | 710          |                    | 302                  |                        | DECB                            |                 |              |
| 21DE 81<br>21E0 26      | 9F<br>74                            | 00224 OPPONT<br>00225 | CMPA           | #\$9F             | 4            | 2283 2A<br>2285 C6 | F9<br>03     |                    | 303<br>304           |                        | BPL                             | LOOP1           |              |
| 21E0 26<br>21E2 34      | 36                                  | 00226 HIT             | BNE<br>PSHS    | HITCHK<br>Y,X,B,A |              | 2287 6C            | 85           |                    | 305 L                |                        | LDB<br>INC                      | #\$03<br>B,X    |              |
| 21E4 17                 | 0078                                | 00227                 | LBSR           | SOUND             | TANK TANK    | 2289 26            | 03           |                    | 306                  |                        | BNE                             | RTS1            |              |
| 21E7 35                 | 36                                  | 00228                 | PULS           | Y,X,B,A           | 1            | 228B 5A            |              |                    | 307                  |                        | DECB                            |                 |              |
| 21E9 86                 | FF                                  | 00229                 | LDA            | #\$FF             |              | 228C 2A<br>228E 39 | F9           |                    | 308<br>309 R         |                        | BPL                             | LOOP2           |              |
| 21EB A7<br>21ED A6      | 20<br>3F                            | 00230<br>00231        | STA<br>LDA     | 0,Y<br>-01,Y      |              | 228E 39            | 1F4E41       |                    | 310 M                |                        | RTS<br>FCC                      | /RONALD         | /            |
| 21EF 81                 | 80                                  | 00232                 | CMPA           | #\$80             |              | 2295               | 60           |                    | 311                  |                        | FCB                             | \$60            |              |
| 21F1 26                 | 07                                  | 00233                 | BNE            | SPACE             |              | 2296 424           |              | 414E 00            | 312                  |                        | FCC                             | /BOULAN         | GER/         |
| 21F3 31                 | 3F                                  | 00234                 | LEAY           | -01,Y             |              |                    | 4552<br>ECC  | 0115               | 2 4 4 4 6            | 1-1-11                 |                                 |                 | ,            |
| 21F5 A7<br>21F7 1F      | 20<br>21                            | 00235 SWAP<br>00236   | STA<br>TFR     | 0,Y               | 100          |                    |              | output             |                      | Charles and the second | THE RESERVE THE PERSON NAMED IN |                 | .)           |
| 21F9 39                 | 21                                  | 00237 RTN             | RTS            | Y, X              |              | 229F<br>22A0 505   | 60<br>524553 |                    | 313<br>314           |                        | FCB<br>FCC                      | \$60<br>/PRESEN | TTS/         |
| 21FA A6                 | 21                                  | 00238 SPACE           | LDA            | 01,Y              | 100          | 545                | 53           |                    |                      |                        |                                 |                 | 10,          |
| 21FC 81                 | 80                                  | 00239                 | CMPA           | #\$80             |              | 22A8               | 60           |                    | 313                  |                        | FCB                             | \$60            |              |
| 21FE 26                 | 04<br>21                            | 00240<br>00241        | BNE            | SPACEL            |              | 22A9 464           |              |                    | 316                  |                        | FCC                             | /FLY/           | ,            |
| 2200 31 2202 20         | F1                                  | 00241                 | LEAY<br>BRA    | 01,Y<br>SWAP      |              | 22AC 534<br>22B2   | 454C45<br>60 |                    | 317 S<br>318         |                        | FCC<br>FCB                      | /SELECT<br>\$60 | /            |
| 2204 A6                 | A8 E0                               | 00243 SPACE1          | LDA            | -\$20,Y           |              | 22B3 535           |              |                    | 319                  |                        | FCC                             | /SPEED/         |              |
| 2207 81                 | 80                                  | 00244                 | CMPA           | #\$80             |              | 22B8               | 60           | 00                 | 320                  |                        | FCB                             | \$60            |              |
| 2209 26                 | 05                                  | 00245                 | BNE            | SPACE2            | Star Sta     | 22B9 283           |              |                    | 321                  |                        | FCC                             | /(1-9)/         |              |
| 220B 31                 | A8 E0                               | 00246                 | LEAY           | -\$20,Y           |              | 00000 m            | 200          |                    | 322                  |                        | END                             | INIT            |              |
| 220E 20                 | E5                                  | 00247                 | BRA            | SWAP              |              | 00000 TC           | TAL E        | KKUKS              |                      |                        |                                 |                 |              |
| AUDON                   | A976 COMP                           |                       |                | ERASE             | 217D         | LOOP2              | 2287         | POLKEY             | AlB1                 |                        | 221C                            | SWAP            | 21F5         |
| BACKSP<br>BEGIN         | 2181 COUN<br>2058 CPUD              |                       |                | EXCH              | 21D2         | MAIN               | 2104<br>228F | POLL               | 2044                 |                        | 22AC                            | TFR             | 21DB         |
| CHCK                    | 21C7 CPUD                           |                       | P 20DC<br>20FB | HIGHS             | 2240<br>21E2 | MESG<br>NEXT       | 20EF         | PRTSEL<br>RESETO   | 216B<br>222A         | SELMUX                 | A9A2<br>2080                    | TIME<br>TIME0   | 213E<br>2230 |
| CHK1                    | 21C4 CPUM                           |                       |                | HITCHK            | 2256         |                    | 21DE         | RETRY              | 2250                 | SOUND                  | 225F                            | TONE            | 2266         |
|                         |                                     |                       |                |                   |              |                    |              |                    |                      |                        |                                 |                 |              |
| CKSIDE                  | 21D7 CPUR                           |                       | 20E6           | INIT              | 2000         | OUV                | 2027         | RND                | 2273                 | SPACE                  | 21FA                            | TXTMOV          | A928         |
| CKSIDE<br>CLS<br>CLSCRN | 2107 CPUR<br>206E CPUU<br>A928 CURD | P 21B0 DIRE           | CT 20E8        | LENTH<br>LOOP1    | 2264         | PLYDIR             | 2193         | RND<br>RTN<br>RTS1 | 2273<br>21F9<br>228E | SPACE SPACE            | 2204                            | TXTMOV<br>UP    | A928<br>2067 |

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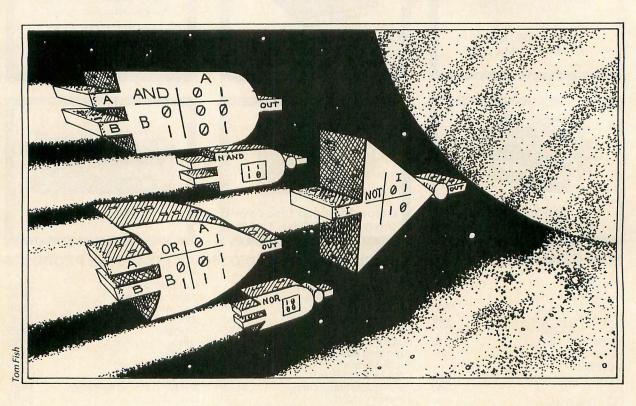
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# AND, OR, NOT

Boolean functions, and what they <u>really</u> mean!



4K Color Basic



B ESIDES THE NORMAL operators for addition, subtraction, multiplication, division, and exponentiation, we have three logical, or Boolean, operators in Basic: AND, OR, and NOT. In most versions of Basic (including Color and Extended Color) these may be used to combine conditions in an If statement, as in IF J>O AND K=1 THEN PRINT "YES". Anyone who sees this realizes that both conditions must be true before the word YES will be printed. Likewise, IF J>O OR K=1 THEN PRINT "YES" means that if either condition is true (or if both are true) the Print statement will be executed.

Boolean operators combine conditions as stated in Basic rather than as stated in English. In English it is quite permissible to say "If A is 2 or 3, add 1 to C." This is not the same as IF A=2 OR 3 THEN C=C+1 as many novice programmers have discovered. In some versions of Basic this statement would be an error. In

#### by Jon J. Schild

Color Computer Basic it is not an error, but it does not do what its author intended.

A similar problem occurs with NOT. It negates a condition stated in Basic, not as stated in English. The English statement "If A is not less than 10, add 1 to C" is not translated as IF A NOT < 10 THEN C=C+1 but as IF NOT A<10 THEN C=C+1. The condition (A<10) must be negated as a whole.

Boolean operators were originally defined on a bit-by-bit basis and can still be used that way in Color Computer Basic. Since they are operators, it is possible to set up a table to show their possible argument values and their results (Table 1).

Each bit of the two operands takes part in the operation as shown. The following program illustrates the operation of AND and OR on whole operands.

10 FOR X = 0 TO 15 : FOR Y = 0 TO 15
20 PRINT X; Y, X and Y; X OR Y
30 NEXT Y
40 PRINT
50 NEXT X

Notice that 3 OR 5 is 7 (in bits: 011 OR 101 = 111) because each bit in one operand is ORed with the corresponding bit in the other. Also, note 3 AND 5 is 1 (011 AND 101 = 001) because the bits are ANDed together in corresponding pairs.

Nice. But how does that relate to the AND and OR in If statements? They are exactly the same thing. All we need do is define the terms *true* and *false* as they relate to conditions and If statements.

The required definitions are:

- True relates to conditions the same as

   1 (all bits set to 1). Really! Try it. Just
   type PRINT 3=3. You will get −1.
- False relates to *conditions* the same as zero (all bits set to 0). You can demonstrate that with PRINT 2+2=5.
- True relates to *If statements* as anything but zero. The Then part of the statement is executed if the condition equals any value except zero.
- False relates to *If statements* as zero, the same as for conditions.

In the normal case we would have something like: IF J>0 OR K=1 THEN PRINT "YES" ELSE PRINT "NO". The condition J>0 is evaluated and yields either a -1 or a zero. The K=1 condition likewise yields either -1 or zero. These two values are then ORed together, and if the result is other than zero, YES is printed. If the result is zero, No is printed.

Let's use these definitions to see why IF A=2 OR 3 THEN C=C+1 doesn't do what was expected. According to Tandy's documentation, relational operators (equals, less than, greater than, less than or equal to, greater than or equal to, and not equal to are executed before Boolean operators (AND, OR, NOT). A=2 is evaluated first, giving as its result either -1 or zero depending on the current value of A. The result is then ORed with three. This can never result in a zero value, so C=C+1 is always executed no matter what value A has.

The Boolean operators can be used in normal Let statements also, which means they can be used in functions defined by the DEF FN statements in Extended Color Basic. That is useful, if you know how to use them. For instance, I wrote a program that involved PEEKing characters from the Color Computer's screen memory. It didn't work. I found that because of the internal character generator in the Video Display Generator (VDG) chip, the

| X | Υ | XANDY | XORY | NOTX |
|---|---|-------|------|------|
| 0 | 0 | 0     | 0    | 1    |
| 0 | 1 | 0     | 1    | 1    |
| 1 | 0 | 0     | 1 1  | 0    |
| 1 | 1 | 12041 | 1    | 0    |

Table 1. Argument Values and Results

code stored in screen memory doesn't always match the normal ASCII code sent via Print statements. CLS: PRINT CHR\$(48): PRINT @ 64 prints a zero at the upper left corner of the screen, but CLS: POKE 1024, 48: PRINT @ 64 prints a reversed zero. Look at Table 2.

It is necessary to convert back and forth in several places. The obvious way to handle this is by using either a function or a GOSUB command to do the conversion. Since Extended Basic lets us define functions, that seems the easiest way to go. Without Extended Basic it would be necessary to use GOSUBs. (It is also possible to do the conversions in assembly language.) I chose to define one function for each conversion. I wrote the two functions below, FNA to convert to ASCII from PEEK/POKE code, and FNP to convert to PEEK/POKE code from ASCII. I will state the functions first, then show how they relate to the discussion in the early part of the article.

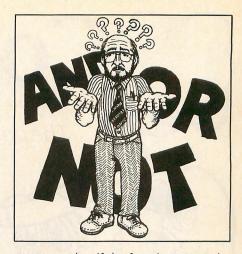
5 DEF FNA(X) = ((((X<&H20) AND &H60) OR ((X<&H40) AND (X>&H1F) AND &HE0) OR ((X<&H80) AND (X>&H5F) AND &HC0)) + X) AND &HFF

10 DEF FNP(X) = ((((X<&H20) AND &H20) OR ((X<&H40) AND (X>&H1F) AND &H40) OR ((X<&H80) AND (X>&H5F) AND &HA0)) + X) AND &HFF

These functions look quite forbidding, so let's examine them piece by piece, beginning with FNA.

((X<&H20) AND &H60) If the PEEK/POKE code (PPc) is less than &H20 (that is, in the range &H00 – &H1F) it needs to be converted to the range &H60 – &H7F. This requires adding &H60 to whatever the code may be. If X is any value in this range, the condition (X<&H20) will be true. That is, it will evaluate to –1 (all bits 1). So ((X<&H20) AND &H60) will evaluate to &H60. If X is a value outside this range, (X<&H20) will be false, or zero, and ((X<&H20) AND &H60) will evaluate to zero.

((X<&H40) AND (X>&H1F) AND &HE0) If the PPc is in the range &H20 through &H3F we need to convert it to the range &H00 through &H1F. This range cannot actually be put on the screen with a Print



statement, but if the functions are to be inverses of each other all codes must convert to something. This requires subtracting &H20, which is the same (for an eight-bit byte) as adding &HEO and then throwing away the high-order bit. We'll worry about that high-order bit later. For a value in the range &H20 through &H3F, both (X<&H40) and (X>&H1F) will evaluate to true (-1) while for any X value outside this range one condition or the other will evaluate to false (0). When the two are ANDed together, a true (-1)will be produced only if both conditions are met. - 1 AND &HEO will give &HEO. If the X value is outside this range, we have 0 AND &HEO, which gives a zero.

((X<&H80) AND(X>&H5F) AND &HCO) In a similar fashion to the preceding part, this will produce &HCO for an X value in the range &H60 through &H7F or zero for any value outside this range.

These three values (two of which will be zero) are ORed together (they could have been added with the same result) and the result is added to the original X value. Two of the ranges will produce an extra high-order bit which needs to be discarded. The AND &HFF at the end of the function will keep only the eight loworder bits, getting rid of the troublesome high-order bit we didn't want. Voila! Whatever PPc was in X to start with, the function now returns the proper adjusted value. Note that two of the PPc ranges, &H40 through &H5F and &H80 through &HFF, will fail all tests and cause a zero to be added to X at the end. That is because those two ranges are the same in PPc and ASCII and thus do not need to be converted.

FNP will work the same way as FNA to perform the reverse conversion.

To use these two in non-Extended Basic, replace DEF FNA(X) or DEF FNP(X) on the left of the equal sign by Y or some other variable name, add :RETURN to the end, and use them as GOSUBs.

| Character Series             | PEEK/POKE Code | ASCII Code |
|------------------------------|----------------|------------|
| @ thru underscore (normal)   | &H40&H5F       | &H40&H5F   |
| @ thru underscore (reversed) | &H00-&H1F      | &H60-&H7F  |
| space through ? (normal)     | &H60&H7F       | &H20-&H3F  |
| space through ? (reversed)   | &H20&H3F       | N/A        |



Editor's note: This month we present the assembly language program for Dennis's Color Burner (Part I — March 1984, Part II — May 1984). This is the last bit of information you'll need to use the Color Burner. We apologize that space considerations made this delay necessary. The package is finally complete!

| ATISSUE<br>ATISSUE |      | Program Listing 2. Ass   |  | J    |                         |         |            |
|--------------------|------|--|--|------|-------------------------|---------|------------|
| A                  |      | 00100 **************   | The College of the Co |      |                         |         |            |
|                    |      | 00110 * COLOR BURNER DRIVER 1.0<br>00120 * BY DENNIS BATHORY KITSZ | 3D16   | A0   | 00600 P27128<br>00610 * | FCB     | \$A0       |
|                    |      | 00130 * COPYRIGHT (C) 1984 BY                                      |  | 3D17 | 00620 TABSP1            | EOU     | *          |
|                    |      | 00140 * DENNIS BATHORY KITSZ                                       | 3D17   | 00   | 00630 OSP1              | FCB     | \$00       |
|                    |      | 00150 **************   | 3D18   | 00   | 00640 RSP1              | FCB     | \$00       |
|                    |      | 00160 *  | 3D19   | 00   | 00650 SSP1              | FCB     | \$00       |
|                    |      | 00170 *  | 3D1A   | 00   | 00660 PSP1              | FCB     | \$00       |
| D00                |      | 00180 ORG \$3D00   |  |      | 00670 *                 |         |            |
|                    |      | 00190 *  |  | 3D1B | 00680 TABSP2            | EOU     | *          |
|                    |      | 00200 * OFFSET (0 4 8 12 16 20                                     | 3D1B   | 00   | 00690 OSP2              | FCB     | \$00       |
|                    |      | 00210 * 24 28) PLACED BY BASIC                                     | 3D1C   | 00   | 00700 RSP2              | FCB     | \$00       |
|                    |      | 00220 * TO INDICATE EPROM TYPE                                     | 3D1D   | 00   | 00710 SSP2              | FCB     | \$00       |
|                    |      | 00230 *  | 3D1E   | 00   | 00720 PSP2              | FCB     | \$00       |
| D00                | 00   | 00240 OFFSET FCB \$00  | THE WATER  |      | 00730 *                 | Sometra |            |
| D01                | 0000 | 00250 STTADR FDB \$0000  |  | 3D1F | 00740 TABSP3            | EOU     | *          |
| D03                | 4000 | 00260 STTDAT FDB \$4000  | 3D1F   | 00   | 00750 OSP3              | FCB     | \$00       |
| D05                | 0800 | 00270 ENDADR FDB \$0800  | 3D20   | 00   | 00760 RSP3              | FCB     | \$00       |
|                    |      | 00280 *  | 3D21   | 00   | 00770 SSP3              | FCB     | \$00       |
|                    |      | 00290 * THE TABLES BELOW HOLD                                      | 3D22   | 00   | 00780 PSP3              | FCB     | \$00       |
|                    |      | 00300 * THE PROGRAMMING DETAILS                                    | nive desired and   |      | 00790 *                 | 100     | 400        |
|                    |      | 00310 * FOR EIGHT EPROMS. FIXED                                    | and some of the  | 3D23 | 00800 TABSP4            | EQU     | *          |
|                    |      | 00320 * TABLES ARE PROVIDED FOR                                    | 3D23   | 00   | 00810 OSP4              | FCB     | \$00       |
|                    |      | 00330 * 2716, 2732, 2764 AND                                       | 3D24   | 00   | 00820 RSP4              | FCB     | \$00       |
|                    |      | 00340 * 27128 EPROMS. OTHER  | 3D25   | 00   | 00830 SSP4              | FCB     | \$00       |
|                    |      | 00350 * TYPES ARE FILLED IN BY                                     | 3D26   | 00   | 00840 PSP4              | FCB     | \$00       |
|                    |      | 00360 * THE BASIC DRIVER.  |  |      | 00850 *                 |         |            |
|                    |      | 00370 *  | The state of the   |      | 00860 * THIS            | ROUTINE | CONFIGURES |
|                    | 3D07 | 00380 TAB16 EQU *  |  |      | 00870 * PORT            |         |            |
| D07                | 03   | 00390 02716 FCB \$03   |  |      | 00880 *                 |         |            |
| D08                | CO   | 00400 R2716 FCB \$C0   | 3D27 8E  | FF40 | 00890 CONAIN            | LDX     | #\$FF40    |
| D09                | 91   | 00410 S2716 FCB \$91   | 3D2A C6  | 04   | 00900                   | LDB     | #\$04      |
| DOA                | 93   | 00420 P2716 FCB \$93   | 3D2C 4F  |      | 00910                   | CLRA    |            |
|                    |      | 00430 *  | 3D2D A7  | 01   | 00920                   | STA     | 1,X        |
|                    | 3D0B | 00440 TAB32 EQU *  | 3D2F A7  | 84   | 00930                   | STA     | , X        |
| DOB                | 02   | 00450 02732 FCB \$02   | 3D31 E7  | 01   | 00940                   | STB     | 1,X        |
| DOC                | CO   | 00460 R2732 FCB \$C0   | 3D33 39  |      | 00950                   | RTS     |            |
| DOD                | 90   | 00470 S2732 FCB \$90   |  |      | 00960 *                 |         |            |
| DOE                | 80   | 00480 P2732 FCB \$80   |  |      | 00970 * THIS            |         |            |
|                    | 2000 | 00490 *  | The state of the s |      | 00980 * THE A           | PORT A  | S OUTPUT   |
| DOD                | 3D0F | 00500 TAB64 EQU *  | 2024 00  | 2210 | 00990 *                 |         | ant .      |
| DOF<br>D10         | 03   | 00510 02764 FCB \$03   | 3D34 8E  | FF40 | 01000 CONAOT            | LDX     | #\$FF40    |
| D10                | C4   | 00520 R2764 FCB \$C4   | 3D37 C6  | 04   | 01010                   | LDB     | #\$04      |
| D11<br>D12         | A4   | 00530 S2764 FCB \$A4   | 3D39 4F  | 0.1  | 01020                   | CLRA    |            |
| DIZ                | A0   | 00540 P2764 FCB \$A0   | 3D3A A7  | 01   | 01030                   | STA     | 1,X        |
|                    | 2012 | 00550 *<br>00560 TABL28 FOR *                                      | 3D3C 4A  | 0.4  | 01040                   | DECA    |            |
| D12                | 3D13 | OCCUPATION DO  | 3D3D A7  | 84   | 01050                   | STA     | X          |
| D13                | 03   | 00570 027128 FCB \$03  | 3D3F E7  | 01   | 01060                   | STB     | 1,X        |
| D14                | C4   | 00580 R27128 FCB \$C4  | 3D41 39  |      | 01070                   | RTS     |            |

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02010 *
                                                                                                   02020 * THIS ROUTINE CONVERTS
                        01090 * THIS ROUTINE CONFIGURES
                        01100 * PORTS B, C AND D AS
01110 * OUTPUTS. B, C AND D
01120 * ARE USED TO PROVIDE A
                                                                                                   02030 * ONE BYTE FROM BINARY
                                                                                                   02040 * TO TWO HEXADECIMAL
02050 * DIGITS AND DISPLAYS
                        01130 * BYTE OF DATA AND AN
01140 * ADDRESS TO THE EPROM
                                                                                                   02060 * THEM ON THE SCREEN.
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                        01150 *
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3D42 C6
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                                                                                                   02090
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                        01160 CONBCD
                                         LDB
                                                    #$04
                                                                                                                     LSRA
3D44 8E
            FF40
                                          LDX
                                                    #$FF40
                                                                           3DA4 44
                                                                                                   02100
3D47 4F
                        01180
                                          CLRA
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                                                                                44
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                                                                                                                     I.SRA
                                                                                                   02120
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                                                    3.X
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                                                                                8 D
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            02
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3D58 A7
            07
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3D5A 4A
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                                          DECA
                                                                           3DBA 39
                                                                                        37
                                                                                                   02240 LETTER
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            07
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                                          STR
                                                    7,X
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                                                                                 39
                                                                                                                     RTS
3D5F 39
                        01330
                                          RTS
                                                                                                   02270
                        01340
                                                                                                           * THE EPROM PROGRAMMING
                        01350
                               * THIS ROUTINE USES THE
                                                                                                   02280
                                                                                                           * ROUTINE BEGINS HERE.
                        01360 * OFFSET POKED BY BASIC
01370 * TO DETERMINE THE EPROM
                                                                                                   02290 * IT CONSISTS OF PORT
                                                                                                   02300 *
                                                                                                             CONFIGURATION, SETTING
                        01380 * TYPE AND SELECT THE
01390 * CORRECT TABLE FOR USE
                                                                                                           * UP ADDRESS AND DATA TO
                                                                                                   02310
                                                                                                   02330 * PROGRAMMING PULSES.
02340 *
                                                                                                   02320 * THE EPROM, AND ISSUING
                        01400 * BY PROGRAMMING SOFTWARE
                        01410 *
3D60 34
            10
                        01420 ETYPE
                                          PSHS
                                                                           3DBE 8E
                                                                                                   02350 PROGMX
                        01430
01440
3D62 8E
            3D07
                                          LDX
                                                    #TAB16
                                                                           3DC1 17
                                                                                        FFA9
                                                                                                   02360
                                                                                                                     LBSR
                                                                                                                               MESSER
3D65 B6
            3D00
                                          LDA
                                                    OFFSET
                                                                                                   02370
                        01450
                                          LEAY
3D68
     31
                                                                                                   02380
                                                                                                             THIS ROUTINE CONFIGURES
                                                    A,X
            10
3D6A 35
                        01460
                                          PULS
                                                                                                           * PORT A FOR OUTPUT TO
                                                                                                   02400 * EPROM, PORTS B C D FOR
02410 * OUTPUT TO EPROM.
3D6C 39
                        01470
                                          RTS
                        01480
                        01490 * THIS ROUTINE DISPLAYS
                                                                                                   02420
                        01500 * MESSAGES DURING READ,
01510 * PROGRAM, VERIFY AND
                                                                                                    02430
                                                                                                           CONFIG
                                                                                                                     LBSR
                                                                                                                                CONAOT
                                                                                                   02440 02450
                                                                           3DC7 17
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                                                                                                                                CONBCD
                        01520 * ERASE CHECK.
                        01530 *
                                                                                                    02460
                                                                                                           * D AND Y REGISTERS ARE
3D6D 108E 0460
                        01540 MESSER
01550
                                          LDY
                                                    #$0460
                                                                                                   02470
                                                                                                             POINTED TO STARTING
3D71 C6
                                                                                                   02480 * ADDRESS OF THE EPROM
            10
                                          LDB
                                                    #$10
3D73 A6
                        01560 MLOOP1
                                          LDA
                                                                                                   02490 *
                                                    , X+
                                                                                                             AND STARTING DATA IN
3D75 A7
3D77 5A
            A0
                        01570
                                          STA
                                                    , Y+
                                                                                                    02500
                                                                                                             MEMORY TO PROGRAM.
                        01580
                                          DECB
                                                                                                   02510 *
3D78 26
            F9
                        01590
                                                                                                   02520
                                                    MLOOP1
                                                                           3DCA FC
                                          BNE
                                                                                       3D01
                                                                                                                     LDD
                                                                                                                                STTADR
3D7A 39
                        01600
                                          RTS
                                                                           3DCD 10BE 3D03
                                                                                                   02530
                                                                                                                     LDY
                                                                                                                                STTDAT
                        01610 *
                                                                                                   02540
                        01620 * THIS ROUTINE PROVIDES
01630 * A SHORT DELAY TO ASSURE
01640 * THAT CONTROL SIGNALS
                                                                                                   02550
                                                                                                             THIS ROUTINE LATCHES
                                                                                                   02560 * DATA INTO THE LOWER
02570 * AND UPPER HALVES OF THE
                        01650 * ARE PROPERLY RECEIVED
01660 * BY BOTH PIA AND EPROM
                                                                                                             EPROM'S ADDRESS, GETS
                                                                                                   02580
                                                                                                   02590 * THE DATA FROM MEMORY,
                                                                                                   02600 *
                        01670 *
                                                                                                             AND LATCHES THAT TO THE EPROM THROUGH THE PIA.
3D7B 34
3D7D C6
            04
                        01680 DELAY1
                                          PSHS
                                                                                                   02610 *
                                                    #$04
                        01690
                                          LDB
                                                                                                   02620 *
3D7F 5A
                        01700 LOOP1
                                          DECB
                                                                           3DD1 E7
                                                                                       02
                                                                                                   02630 AGAIN
                                                                                                                     STB
3D80 26
                        01710
                                          BNE
                                                    LOOP1
                                                                           3DD3 A7
3DD5 34
                                                                                        04
                                                                                                   02640
                                                                                                                     STA
                                                                                                                                4 , X
                        01720
01730
3D82 35
            04
                                          PULS
                                                                                        06
                                                                                                   02650
                                                                                                                     PSHS
                                                                                                                                D
3D84 39
                                         RTS
                                                                           3DD7 A6
                                                                                        A0
                                                                                                                                , Y+
                                                                                                   02660
                                                                                                                     LDA
                        01740
                                                                           3DD9 A7
                                                                                        84
                                                                                                   02670
                                                                                                                     STA
                        01750 * THIS ROUTINE CREATES A
                                                                                                   02680
                        01760 * 50 MS DELAY REQUIRED
                                                                                                   02690 * THE ADDRESS AND DATA
                        01770 * FOR THE PROGRAMMING
01780 * PROCESS. THE ACTUAL
                                                                                                   02700 * ARE DISPLAYED FOR THE
                                                                                                   02710 * USER AS THE PROGRAMMING
02720 * GOES ON.
                        01790 * DELAY CREATED HERE IS
                        01800 * APPROXIMATELY 50.1 MS
                                                                                                   02730 *
                        01810
                                                                           3DDB 34
                                                                                       20
                                                                                                   02740
02750
                                                                                                                     PSHS
3D85 34
            06
                        01820 D50MS
                                          PSHS
                                                                           3DDD 108E 0478
3DE1 17 FFBD
                                                                                                                               #$0478
                                                                                                                     LDY
            18F8
                                                    #$18F8
#$0001
3D87 CC
                        01830
                                          LDD
                                                                                                   02760
                                                                                                                     LBSR
                                                                                                                                SHOWAD
3D8A 83
            0001
                        01840 LOOP50
                                          SUBD
                                                                                                   02770
02780
                                                                           3DE4
                                                                                 35
                                                                                        20
                                                                                                                     PULS
3D8D 26
            FB
                                          BNE
                                                    LOOP50
                                                                                 35
                                                                           3DE6
                                                                                        06
                                                                                                                     PULS
                                                                                                                                D
                        01860
01870
                                          PULS
                                                                                                   02790
3D8F 35
            06
                                                                           3DE8
                                                                                 34
                                                                                        06
                                                                                                                     PSHS
                                                                                                                                D
3D91 39
                                          RTS
                                                                           3DEA
                                                                                 17
                                                                                        FFA5
                                                                                                   02800
                                                                                                                      LBSR
                                                                                                                                DISADR
                        01880
                                                                           3DED
                                                                                 35
                                                                                        06
                                                                                                   02810
                                                                                                                     PULS
                                                                                                                                D
                        01890 * THIS ROUTINE DISPLAYS
                                                                                                   02820
                                                                           3DEF
                                                                                        06
                                                                                                                     PSHS
                                                                                                                               D
                        01900 * A 16-BIT ADDRESS IN HEX
01910 * BY CALLING THE BYTE
                                                                                                   02830
                                                                                                   02840 * THE ACTUAL PROGRAMMING
02850 * TAKES PLACE IN THIS
02860 * ROUTINE. INTERRUPTS
                        01920 * DISPLAY ROUTINE TWICE
                        01930 *
                                                                                                             ARE DISABLED TO KEEP
3092 34
            30
                        01940 DISADR
                                          PSHS
                                                                                                   02870 *
3D94 108E
            0470
                        01950
                                                    #$0470
                                          LDY
                                                                                                             THE PROGRAMMING PULSE
                                                                                                   02880
3D98 8D
            07
                                                                                                             OF THE CORRECT LENGTH,
                        01960
                                          BSR
                                                    SHOWAD
                                                                                                   02890
3D9A 1F
3D9C 8D
            98
                        01970
                                                                                                   02900 *
                                                                                                             THE EPROM TYPE IS
                                          TFR
                                                    B,A
                                                                                                   02910 * ESTABLISHED, AND A
02920 * SEQUENCE OF OFF-READ-
            03
                        01980
                                          BSR
                                                    SHOWAD
3D9E
            30
                        01990
                                          PULS
                                                    X,Y
3DA0 39
                        02000
                                                                                                          * GET SET-PULSE-GET SET-
```

|                              | 02040 + DEAD OFF TO FOLLOWED                         |                          | 02200 #   |
|------------------------------|--|--------------------------|---|
|                              | 02940 * READ-OFF IS FOLLOWED.<br>02950 *             | 2=22 0= 2=00             | 03380 *   |
| 2001 11 50                   |  | 3E33 8E 3F88             | 03390 LDX #MESSG7   |
| 3DF1 1A 50                   | 02960 PROGRM ORCC #\$50                              | 3E36 C6 OD               | 03400 LDB #13   |
| 3DF3 34 20                   | 02970 PSHS Y   | 3E38 17 FF32             | 03410 LBSR MESSER   |
| 3DF5 17 FF68                 | 02980 LBSR ETYPE                                     | 3E3B 39                  | 03420 RTS   |
| 3DF8 A6 A4                   | 02990 LDA ,Y   |                          | 03430 *   |
| 3DFA A7 06                   | 03000 STA 6,X  |                          | 03440 * THE CHECK FOR AN ERASED                             |
| 3DFC 17 FF7C                 | 03010 LBSR DELAY1                                    |                          | 03450 * EPROM BEGINS HERE. AN                               |
| 3DFF A6 21                   | 03020 LDA 1,Y  |                          | 03460 * ERASED EPROM CONTAINS                               |
| 3E01 A7 06                   | 03030 STA 6,X  |                          | 03470 * ALL FF (255) AS SENT                                |
| 3E03 17 FF75                 | 03040 LBSR DELAY1                                    |                          | 03480 * FROM THE FACTORY, OR                                |
| 3E06 A6 22                   | 03050 LDA 2,Y  |                          | 03490 * AFTER ERASURE UNDER                                 |
| 3E08 A7 06                   | 03060 STA 6,X  |                          | 03500 * ULTRAVIOLET LIGHT. THIS                             |
| 3E0A 17 FF6E                 | 03070 LBSR DELAY1                                    |                          | 03510 * ROUTINE READS THE VALUE                             |
| 3EOD A6 23                   | 03080 LDA 3,Y  |                          | 03520 * IN THE EPROM.                                       |
| 3EOF A7 06                   | 03090 STA 6,X  |                          | 03530 *   |
| 3E11 17 FF71                 | 03100 LBSR D50MS                                     | 3E3C 8E 3F48             | 03540 ERASEX LDX #MESSG3                                    |
| 3E14 A6 22                   | 03110 LDA 2,Y  | 3E3F 17 FF2B             | 03550 LBSR MESSER   |
| 3E16 A7 06                   | 03120 STA 6,X  |                          | 03560 *   |
| 3E18 17 FF60                 | 03130 LBSR DELAY1                                    |                          | 03570 * SETUP WITH PORT A AS                                |
| 3E1B A6 21                   | 03140 LDA 1,Y  |                          | 03580 * INPUT AND PORTS B, C                                |
| 3E1D A7 06                   | 03150 STA 6,X  |                          | 03590 * AND D AS OUTPUT FOLLOWS                             |
| 3E1F 17 FF59                 | 03160 LBSR DELAY1                                    | 2012 17 0000             | 03600 *   |
| 3E22 A6 A4                   | 03170 : LDA ,Y                                       | 3E42 17 FEE2             | 03610 LBSR CONAIN   |
| 3E24 A7 06                   | 03180 STA 6,X  | 3E45 17 FEFA             | 03620 LBSR CONBCD   |
|                              | 03190 *  | 3E48 17 FF15             | 03630 LBSR ETYPE  |
|                              | 03200 * ONE BYTE HAS BEEN                            | 3E4B A6 21               | 03640 LDA 1,Y   |
|                              | 03210 * BURNED; A CHECK IS MADE                      | 3E4D A7 06               | 03650 STA 6,X   |
|                              | 03220 * TO SEE IF THE PROCESS                        |                          | 03660 *   |
|                              | 03230 * IS COMPLETE. IF NOT,                         |                          | 03670 * D IS POINTED TO THE                                 |
|                              | 03240 * THE NEXT BYTE IS TAKEN                       |                          | 03680 * STARTING ADDRESS IN THE                             |
|                              | 03250 * FROM MEMORY FOR BURNING                      |                          | 03690 * EPROM   |
|                              | 03260 * INTO THE EPROM.                              | 2040 00 2001             | 03700 *   |
| 2005 25 05                   | 03270 *  | 3E4F FC 3D01             | 03710 LDD STTADR<br>03720 *                                 |
| 3E26 35 20                   | 03280 PULS Y   |                          |   |
| 3E28 35 06                   | 03290 PULS D   |                          | 03730 * THE LSB AND MSB OF THE                              |
| 3E2A C3 0001                 | 03300 ADDD #\$0001                                   |                          | 03740 * ADDRESS ARE LATCHED                                 |
| 3E2D 10B3 3D05<br>3E31 26 9E | 03310 CMPD ENDADR                                    |                          | 03750 * INTO THE EPROM, AND<br>03760 * THE ADDRESS AND DATA |
| 3E31 26 9E                   | 03320 BNE AGAIN                                      |                          |   |
|                              | 03330 *  |                          | 03770 * ARE DISPLAYED FOR THE 03780 * USER.                 |
|                              | 03340 * IF THE BURNING IS DONE,                      |                          |   |
|                              | 03350 * A MESSAGE IS DISPLAYED                       | 3E52 E7 02               | 03790 *<br>03800 AGIN1 STB 2.X                              |
|                              | 03360 * AND CONTROL IS RETURNED<br>03370 * TO BASIC. | 3E52 E7 02<br>3E54 A7 04 | 03800 AGIN1 STB 2,X<br>03810 STA 4,X                        |
|                              | 03370 " 10 BASIC.                                    | 1 3534 A/ 04             | 03010 31A 4,A   |

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Color Computer/101

| 3E56 34 06   | 03820 PSHS D                            |                              | 04260 * Y POINTS TO THE DATA                                     |
|--|---|------------------------------|--|
| 3E58 17 FF37   | 03830 LBSR DISADR                       |                              | 04270 * STORED IN MEMORY.  |
| 3E5B A6 84   | 03840 LDA ,X                            |                              | 04280 *  |
| 3E5D 34 22   | 03850 PSHS Y,A                          | 3E94 FC 3D01                 | 04290 LDD STTADR   |
| 3E5F 108E 0478   | 03860 LDY #\$0478                       | 3E97 10BE 3D03               | 04300 LDY STTDAT   |
| 3E63 17 FF3B   | 03870 LBSR SHOWAD                       |                              | 04310 *  |
| 3E66 35 22   | 03880 PULS A,Y                          |                              | 04320 * A AND B ARE LATCHED AS<br>04330 * THE LSB AND MSB OF THE |
| 3E68 81 FF   | 03890 CMPA #\$FF                        |                              | 04340 * EPROM'S ADDRESS, AND                                     |
| 3E6A 35 06   | 03900 PULS D                            |                              | 04350 * ALL THE INFORMATION IN                                   |
| 3E6C 26 0E   | 03910 BNE EFAULT                        |                              | 04360 * PROGRESS IS DISPLAYED                                    |
| 3E6E C3 0001   | 03920 ADDD #\$0001<br>03930 CMPD ENDADR |                              | 04370 * FOR THE USER.  |
| 3E71 10B3 3D05<br>3E75 26 DB   | 03940 BNE AGIN1                         |                              | 04380 *  |
| 3E/3 20 DB   | 03950 *                                 | 3E9B E7 02                   | 04390 AGIN2 STB 2,X  |
|  | 03960 * A CORRECT ERASURE OR            | 3E9D A7 04                   | 04400 STA 4,X  |
|  | 03970 * A FAILED ERASURE IS             | 3E9F 34 06                   | 04410 PSHS D   |
| and store and st | 03980 * DISPLAYED FOR THE USER.         | 3EA1 17 FEEE                 | 04420 LBSR DISADR  |
| BERTHE LOS   | 03990 *                                 | 3EA4 A6 84                   | 04430 LDA ,X   |
| 3E77 8E 3F98   | 04000 LDX #MESSG8                       | 3EA6 34 20                   | 04440 PSHS Y   |
| 3E7A 20 5A   | 04010 BRA OUT1                          | 3EA8 108E 0478               | 04450 LDY #\$0478  |
|  | 04020 *                                 | 3EAC 17 FEF2                 | 04460 LBSR SHOWAD<br>04470 LDA #\$7A                             |
| 3E7C 8E 3F68   | 04030 EFAULT LDX #MESSG5                | 3EAF 86 7A                   | 04470 LDA #\$7A<br>04480 STA ,Y+                                 |
| 3E7F 20 55   | 04040 BRA OUT1                          | 3EB1 A7 A0<br>3EB3 35 20     | 04490 PULS Y   |
|  | 04050 * 04060 * THE VERIFY ROUTINE      | 3EB5 A6 A4                   | 04500 LDA ,Y   |
|  | 04070 * (COMPARISON OF EPROM            | 3EB7 34 20                   | 04510 PSHS Y   |
|  | 04080 * WITH MEMORY CONTENTS)           | 3EB9 108E 047C               | 04520 LDY #\$047C  |
|  | 04090 * BEGINS HERE. THE SETUP          | 3EBD 17 FEE1                 | 04530 LBSR SHOWAD  |
|  | 04100 * OF PORT A AS INPUT AND          | 3ECO 35 20                   | 04540 PULS Y   |
| ACTUAL TO THE TOP IN THE   | 04110 * PORTS B, C AND D AS             | 3EC2 A6 84                   | 04550 LDA ,X   |
| THE RESERVOIS  | 04120 * OUTPUT, PLUS EPROM              | 3EC4 Al AO                   | 04560 CMPA ,Y+   |
|  | 04130 * TYPING, IS DONE HERE.           | 3EC6 35 06                   | 04570 PULS D   |
|  | 04140 *                                 | 3EC8 26 10                   | 04580 BNE VFAULT   |
| 3E81 8E 3F38   | 04150 VERIFX LDX #MESSG2                | 3ECA C3 0001                 | 04590 BACK ADDD #\$0001<br>04600 CMPD ENDADR                     |
| 3E84 17 FEE6   | 04160 LBSR MESSER<br>04170 *            | 3ECD 10B3 3D05<br>3ED1 26 C8 | 04610 BNE AGIN2  |
| 3E87 17 FE9D   | 04170 * 04180 LBSR CONAIN               |                              | 04620 *  |
| 3E8A 17 FEB5   | 04190 LBSR CONBCD                       | -/-                          | 04630 * EITHER A VERIFICATION                                    |
| 3E8D 17 FED0   | 04200 LBSR ETYPE                        | -)                           | 04640 * COMPLETE OR A VERIFY                                     |
| 3E90 A6 21   | 04210 LDA 1,Y                           |                              | 04650 * FAILURE IS REPORTED IN                                   |
| 3E92 A7 06   | 04220 STA 6,X                           |                              | 04660 * THE MESSAGES THAT  |
|  | 04230 *                                 |                              | 04670 * FOLLOW.  |
|  | 04240 * D POINTS TO THE START           |                              | 04680 *  |
|  | 04250 * ADDRESS IN THE EPROM,           | 3ED3 8E 3FA8                 | 04690 LDX #MESSG9  |
|  |   |                              |  |



| 3ED6 | 17   | FE94 | 04700 | OUT1    | LBSR     | MESSER     | 1 3FC         | 9 A6 | 84              | 05150    |          | LDA      | , X             |
|------|------|------|-------|---------|----------|------------|---------------|------|-----------------|----------|----------|----------|-----------------|
| 3ED9 | 39   |      | 04710 |         | RTS      |            |               | B 34 |                 | 05160    |          | PSHS     | A,Y             |
|      |      |      | 04720 | *       |          |            |               |      | 8E 0478         | 05170    |          | LDY      | #\$0478         |
| 3EDA | 34   | 36   |       | VFAULT  | PSHS     | X,Y,D      |               | 1 17 |                 | 05180    |          | LBSR     | SHOWAD          |
| 3EDC |      | 3F58 | 04740 | VINOBI  | LDX      | #MESSG4    |               | 4 35 |                 | 05190    |          | PULS     | Y, A            |
| 3EDF |      | FE8B | 04750 |         | LBSR     | MESSER     |               | 6 A7 |                 | 05200    |          | STA      | , Y+            |
| 3EE2 |      | 36   | 04760 |         | PULS     | X,Y,D      |               | 8 35 |                 | 05210    |          | PULS     | D               |
| 3EE4 |      | E4   | 04770 |         | BRA      | BACK       |               | A C3 |                 | 05210    |          |          | #\$0001         |
| 3EE4 | 20   | E4   | 04770 |         | DRA      | BACK       |               |      |                 |          |          | ADDD     |                 |
|      |      |      |       |         |          |            |               |      | B3 3D05         | 05230    |          | CMPD     | ENDADR          |
|      |      |      |       |         |          | O READ THE | 3F2           | 1 26 | DD              | 05240    |          | BNE      | AGIN3           |
|      |      |      |       |         | NTS OF A |            |               |      | k is the second | 05250    | *        |          |                 |
|      |      |      |       |         | MEMORY B | EGINS HERE |               | 3 8E |                 | 05260    |          | LDX      | #MESSGB         |
|      |      |      | 04820 |         |          |            | 3F2           | 6 20 | AE              | 05270    |          | BRA      | OUT1            |
| 3EE6 |      | 3FB8 |       | READRX  |          | #MESSGA    | COST CONTRACT |      |                 | 05280    |          |          |                 |
| 3EE9 | 17   | FE81 | 04840 |         | LBSR     | MESSER     |               |      |                 | 05290    | *        |          |                 |
|      |      |      | 04850 | *       |          |            |               |      |                 | 05300    | * THE MI | ESSAGES  | TO BE           |
|      |      |      | 04860 | * THE U | SUAL SET | UP OF PORT |               |      |                 | 05310    | * DISPL  | AYED FOL | LOW HERE.       |
|      |      |      | 04870 | * A AS  | INPUT, P | ORTS B, C  |               |      |                 | 05320    | * NOT A  | LL THE M | IESSAGES        |
|      |      |      |       |         |          | UT FOLLOWS |               |      |                 | 05330    | * ARE US | SED BY V | ERSION 1.0      |
|      |      |      | 04890 |         |          |            |               |      |                 |          | * OF TH  |          |                 |
| 3EEC | 17   | FE38 | 04900 |         | LBSR     | CONAIN     |               |      |                 |          | * SOFTW  |          | Dominan         |
|      | -    |      |       |         |          |            |               |      |                 | 05360    |          | TICE.    |                 |
| 3EEF |      | FE50 | 04910 |         | LBSR     | CONBCD     | 3F2           | Ω 5  | 0524F475241     |          |          | FCC      | /PROGRAMMING/   |
| 3EF2 |      | FE6B | 04920 |         | LBSR     | ETYPE      | 31.2          |      | D4D494E47       |          |          |          | compressed -Ed) |
| 3EF5 | A6   | 21   | 04930 |         | LDA      | 1,Y        | 3F3           |      | 6060            | 05380    | AII FC   | FDB      | \$6060          |
| 3EF7 | A7   | 06   | 04940 |         | STA      | 6,X        | 3F3           |      | 6060            | 05390    |          | FDB      | \$6060          |
|      |      |      | 04950 | *       |          |            |               |      |                 |          |          |          |                 |
|      |      |      | 04960 | * D POI | NTS TO T | HE EPROM   | 3F3           |      | 60              | 05400    | w======  | FCB      | \$60            |
|      |      |      | 04970 | * START | ADDRESS  | , Y POINTS | 3F3           |      | 64552494659     | 05410    | MESSG2   | FCC      | /VERIFYING/     |
|      |      |      | 04980 | * TO TH | E STARTI | NG PLACE   | 2-            |      | 94E47           | 05400    |          |          | 25252           |
|      |      |      | 04990 | * FOR D | ATA STOR | AGE IN     | 3F4           |      | 6060            | 05420    |          | FDB      | \$6060          |
|      |      |      |       | * MEMOR |          |            | 3F4           |      | 6060            | 05430    |          | FDB      | \$6060          |
|      |      |      | 05010 |         |          |            | 3F4           |      | 6060            | 05440    |          | FDB      | \$6060          |
| 3EF9 | FC   | 3D01 | 05020 |         | LDD      | STTADR     | 3F4           |      | 60              | 05450    |          | FCB      | \$60            |
| 3EFC |      |      | 05030 |         | LDY      | STTDAT     | 3F4           | 8 4  | 552415345       |          | MESSG3   | FCC      | /ERASE/         |
| Juic | TOPL | 3003 | 05040 | *       | прт      | SIIDAI     | 3F4           | D    | 60              | 05470    |          | FCB      | \$60            |
|      |      |      |       |         | SSES ARE | LAMCHED    | 3F4           | E 4  | 34845434B       | 05480    |          | FCC      | /CHECK/         |
|      |      |      |       |         | THE EPRO |            | 3F5           | 3    | 6060            | 05490    |          | FDB      | \$6060          |
|      |      |      |       |         | NFORMATI |            | 3F5           | 5    | 6060            | 05500    |          | FDB      | \$6060          |
|      |      |      |       |         |          |            | 3F5           | 7    | 60              | 05510    |          | FCB      | \$60            |
|      |      |      |       |         | AYED FOR | THE        | 3F5           |      | 64552494659     |          | MECCCA   | FCC      | /VERIFY/        |
|      |      |      |       | * USER. |          |            |               |      |                 |          | HESSG4   | FCB      | \$60            |
|      |      |      | 05100 |         |          |            | 3F5           | _    | 60              | 05530    |          |          |                 |
| 3F00 |      | 02   |       | AGIN3   | STB      | 2,X        | 3F5           | -    | 641494C53       | 05540    |          | FCC      | /FAILS/         |
| 3F02 |      | 04   | 05120 |         | STA      | 4,X        | 3F6           |      | 60              | 05550    |          | FCB      | \$60            |
| 3F04 |      | 06   | 05130 |         | PSHS     | D          | 3F6           |      | 154             | 05560    |          | FCC      | /AT/            |
| 3F06 | 17   | FE89 | 05140 |         | LBSR     | DISADR     | 3F6           | 7    | 60              | 05570    |          | FCB      | \$60            |
|      |      |      |       |         |          |            |               |      |                 | The said |          |          |                 |

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| 1 | 3F68         | 4552415345       |                | MESSG5 | FCC        | /ERASE/         | 3FE2   | 54595045           | 06000           |              | FCC  | /TYPE/           |              |
|---|--------------|------------------|----------------|--------|------------|-----------------|--------|--------------------|-----------------|--------------|------|------------------|--------------|
|   | 3F6D         | 60               | 05590          |        | FCB        | \$60            | 3FE6   | 6060               | 06010           |              | FDB  | \$6060           |              |
|   | 3F6E         | 4641494C53       | 05600          |        | FCC        | /FAILS/         | 3FE8   | 44424B495453       | 06020 MES       | SGD          | FCC  | /DBKITS          | Z/           |
|   | 3F73         | 60               | 05610          |        | FCB        | \$60            |        | 5A                 | 25220           |              |      | 0.00             |              |
|   | 3F74         | 4154             | 05620          |        | FCC        | /AT/            | 3FEF   | 60                 | 06030           |              | FCB  | \$60             |              |
|   | 3F76         | 6060             | 05630          | ипадас | FDB<br>FCC | \$6060          | 3FF0   | 524F58425552<br>59 | 06040           |              | FCC  | /ROXBUR          | Y/           |
|   | 3F78<br>3F7C | 4255524E<br>60   | 05650          | MESSG6 | FCB        | /BURN/<br>\$60  | 3FF7   | 60                 | 06050           |              | FCB  | \$60             |              |
|   | 3F7D         | 4641494C53       | 05660          |        | FCC        | /FAILS/         | 3FF/   | 60                 | 06060 *         |              | FCB  | \$60             |              |
|   | 3F82         | 60               | 05670          |        | FCB        | \$60            |        | 3FF8               | 06070 ZZZ       | 777          | EOU  | *                |              |
|   | 3F83         | 4154             | 05680          |        | FCC        | /AT/            |        | 3770               | 06080 *         | 444          | EQU  |                  |              |
|   | 3F85         | 6060             | 05690          |        | FDB        | \$6060          |        | 0000               | 06090           |              | END  |                  |              |
|   | 3F87         | 60               | 05700          |        | FCB        | \$60            | 00000  | TOTAL ERRORS       | 00000           |              | DIVD |                  |              |
|   | 3F88         | 4255524E         |                | MESSG7 | FCC        | /BURN/          | 00000  | TOTAL BRROKE       |                 |              |      |                  |              |
|   | 3F8C         | 60               | 05720          | провол | FCB        | \$60            |        |                    |                 |              |      |                  |              |
|   | 3F8D         | 434F4D504C45     |                |        | FCC        | /COMPLETE/      |        |                    |                 |              |      |                  |              |
|   |              | 5445             |                |        |            | ,,              | AGAIN  | 3DD1               | MESSG9          | 3FA8         |      | R2764            | 3D10         |
|   | 3F95         | 6060             | 05740          |        | FDB        | \$6060          | AGIN1  | 3E52               | MESSGA          | 3FB8         |      | READRX           | 3EE6         |
|   | 3F97         | 60               | 05750          |        | FCB        | \$60            | AGIN2  | 3E9B               | MESSGB          | 3FC8         |      | RSP1             | 3D18         |
|   | 3F98         | 4550524F4D       | 05760          | MESSG8 | FCC        | /EPROM/         | AGIN3  | 3F00               | MESSGC          | 3FD8         |      | RSP2             | 3D1C         |
|   | 3F9D         | 60               | 05770          |        | FCB        | \$60            | BACK   | 3ECA               | MESSGD          | 3FE8         |      | RSP3             | 3D20         |
|   | 3F9E         | 455241534544     | 05780          |        | FCC        | /ERASED/        | CONAIN |                    | MLOOP1          | 3D73         |      | RSP4             | 3D24         |
|   | 3FA4         | 6060             | 05790          |        | FDB        | \$6060          | CONAOT |                    | 027128          | 3D13         |      | S27128           | 3D15         |
|   | 3FA6         | 6060             | 05800          |        | FDB        | \$6060          | CONBC  |                    | 02716           | 3D07         |      | S2716            | 3009         |
|   | 3FA8         | 564552494659     |                | MESSG9 | FCC        | /VERIFY/        | CONFIG |                    | 02732           | 3D0B         |      | S2732            | 3D0D         |
|   | 3FAE         | 60               | 05820          |        | FCB        | \$60            | CONVRT |                    | 02764           | 3D0F         |      | S2764            | 3D11         |
|   | 3FAF         | 434F4D504C45     | 05830          |        | FCC        | /COMPLETE/      | D50MS  | 3D85               | OFFSET          | 3D00         |      | SHOWAD           | 3DA1         |
|   |              | 5445             |                |        |            |                 | DELAYI |                    | OSP1            | 3D17         |      | SSPl             | 3D19         |
|   | 3FB7         | 60               | 05840          |        | FCB        | \$60            | DISADE |                    | OSP2            | 3D1B         |      | SSP2             | 3D1D         |
| 1 | 3FB8         | 52454144494E     | 05850          | MESSGA | FCC        | /READING/       | EFAULT |                    | OSP3            | 3D1F         |      | SSP3             | 3D21         |
|   | 2000         | 47               | 05060          |        | nan        | 252             | ENDADE |                    | OSP4            | 3D23         |      | SSP4             | 3D25         |
|   | 3FBF<br>3FC0 | 60<br>4550524F4D | 05860<br>05870 |        | FCB<br>FCC | \$60<br>/EPROM/ | ERASEX | 3D60               | OUT1<br>P27128  | 3ED6<br>3D16 |      | STTADR<br>STTDAT | 3D01<br>3D03 |
|   | 3FC5         | 6060             | 05870          |        | FDB        | \$6060          | LETTER |                    | P27128<br>P2716 | 3D16         |      | TAB128           | 3D03         |
|   | 3FC7         | 60               | 05890          |        | FCB        | \$60            | LOOP1  | 3D7F               | P2732           | 3DOE         |      | TAB120           | 3D13         |
|   | 3FC8         | 4550524F4D       |                | MESSGB | FCC        | /EPROM/         | LOOP1  |                    | P2764           | 3D12         |      | TAB32            | 3D07         |
|   | 3FCD         | 60               | 05910          | прообр | FCB        | \$60            | MESSER |                    | PROGMX          | 3DBE         |      | TAB64            | 3DOF         |
|   | 3FCE         | 52454144         | 05920          |        | FCC        | /READ/          | MESSGI |                    | PROGRM          | 3DF1         |      | TABSP1           | 3D17         |
|   | 3FD2         | 6060             | 05930          |        | FDB        | \$6060          | MESSG  |                    | PSP1            | 3D1A         |      | TABSP2           | 3D1B         |
|   | 3FD4         | 6060             | 05940          |        | FDB        | \$6060          | MESSG  |                    | PSP2            | 3D1E         |      | TABSP3           | 3D1F         |
|   | 3FD6         | 6060             | 05950          |        | FDB        | \$6060          | MESSG4 |                    | PSP3            | 3D22         |      | TABSP4           | 3D23         |
| 1 | 3FD8         | 424144           |                | MESSGC | FCC        | /BAD/           | MESSG  |                    | PSP4            | 3D26         |      | VERIFX           | 3E81         |
|   | 3FDB         | 60               | 05970          |        | FCB        | \$60            | MESSG  |                    | R27128          | 3D14         |      | VFAULT           | 3EDA         |
|   | 3FDC         | 4550524F4D       | 05980          |        | FCC        | /EPROM/         | MESSG  |                    | R2716           | 3D08         |      | ZZZZZZ           | 3FF8         |
|   | 3FE1         | 60               | 05990          |        | FCB        | \$60            | MESSGE | 3 3F98             | R2732           | 3DOC         |      |                  |              |

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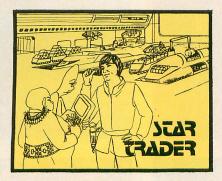
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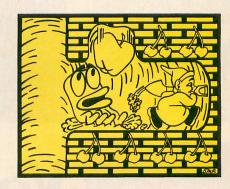
#### MR DIG

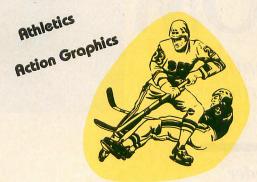
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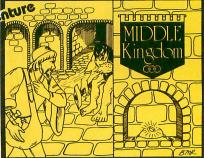


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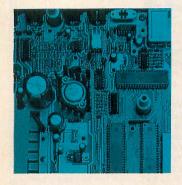
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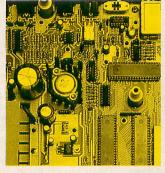
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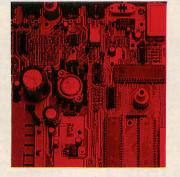
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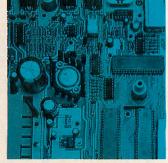
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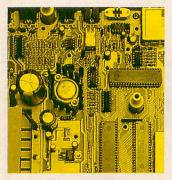
# Dissecting



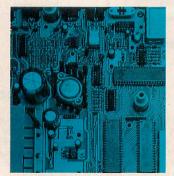


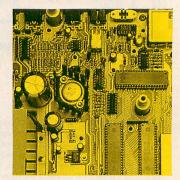








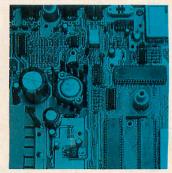






# Your ROM

Extended Basic continues.
The tenth of 14 articles.



#### by Jake Commander

HERE'S NOT TOO MUCH I can add this month — the code says it all by itself. Apart from the humble HEX\$ function, the code splits nicely into two parts: that which deals with the Renumber (RENUM) command, and that which deals with RS-232-related input/output.

The Renumber routine operates in three passes. The first validates the line numbers to ensure all referenced line numbers are defined in the program. At the same time, all line numbers are converted to a five-byte binary format. Then the start line numbers are renumbered, and finally the five-byte binary numbers are reconverted to ASCII and renumbered as appropriate. This can be a little difficult to follow, as a couple of subroutines operate differently on each pass.

Following on the heels of RENUM is the HEX\$ function. This is another string function, which is only remarkable in that it's not included along with the string functions in last month's code.

The last block of code deals with the

DLOAD command, which hardly gets a mention in the version of the user's manual I'm blessed with. The mysterious protocol required to use the DLOAD command can be unravelled from this routine. Also included are a host of routines dealing with RS-232 interfacing, such as block and character I/O. These routines serve to make the Color Computer a much more useful machine than the manual alludes to. Why the DLOAD command is so downplayed still puzzles me.

# WHAT THE Program Listing. ROM Dissection—Part 10

|                       | Jake's Comment                        | Get next line link RTS to caller if end prog Add inc to line number | ire Error in too big<br>iline number LSB < 250?<br>;OK if so<br>;?FC Error otherwise | . save and line         | ;End link;<br>;Restore new line number         | ;If not end prog<br>;Else adj stak to skip nrml RTS |   | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | just for n                     | ;=> next line link<br>;RTS to caller if end prog | chr               | ; bump to next byte :Get byte from Basic line | ; If end of line          | Hold line number gap start | Yes search for ref'd line | ;=2, at line # gap start?     | ; is so ;=3, at line # gap start?                           | ;No, get next byte | Flag for undefined line number ;Set flag & posn X      | ;Skip over line number gap | Line number MSB in A     | -                         | ;Else reset MSB zero           | really zero?  |            | ;Else reset LSB zero           | ;Hold binary line number ;Save it for search | ; Search for this line | Restore line number gap start:       | This line link or line number | Set gap byte 0 to 1 or 2 | scan past               | gap start = 1   | Get line number | ;Save for gap replacement<br>;Save & flag line number in gap   |      |
|-----------------------|---------------------------------------|---|--|-------------------------|--|---|---|---------------------------------------|--------------------------------|--|-------------------|---|---------------------------|----------------------------|---------------------------|-------------------------------|---|--------------------|--|----------------------------|--------------------------|---------------------------|--------------------------------|---|------------|--------------------------------|--|------------------------|--------------------------------------|-------------------------------|--------------------------|-------------------------|-----------------|-----------------|--|------|
|                       | Mnemonic Operand                      | LDX ,X<br>BSR \$8A86<br>ADDD <\$CF<br>BIO \$8A82                    | ₫:   |                         | LDD ,X<br>PULS A,B                             | BNE \$8A90<br>LEAS 2,S                              |   | ifo                                   |                                | BSR \$8A86                                       |                   | LDA .X  |                           | STX <\$0F                  | BEQ \$8AB2                |                               | BEQ \$8AD3  |                    | LDA #3<br>STA ,X+                                      |                            | LDD 1,X                  |                           | CLRA 2 V                       |   | BEQ \$8AC0 | m                              | STD 1,X<br>STD. <\$2B                        |                        | BLO SBAAC                            |                               | INC ,X+                  | BRA \$8A99              |                 |                 | STX <\$47<br>BRA \$8AC7  | 000  |
| "Dissection — Fall 10 | Line Code Object<br>Numbr Addr Code M | 8A77 AE<br>8A79 8D<br>8A7B D3                                       | 01275 8A7F 81 FA<br>01276 8A7F 81 FA<br>01277 8A81 25 EE<br>01278 8A83 7E B44A       | RTS 1 back if end prog  | 8488<br>848A                                   | 01282 8A8C 26 02<br>01283 8A8E 32 62                | 8A90 39                                     | line num                              | 01286 8A93 30 1F               | 8A95 30<br>8A97 8D                               | 8A99              | 8A9D A6                                       | 8A9F 27                   | 8AA1                       | 8AA4                      | 8AA6 4A                       | 8AA9  | 8AAA 26            |  | 8AB0 20                    | 01303 8AB2 EC 01         | 8AB6 27                   | 01306 8AB8 4F                  | SABB 6A 0   | 27 0       | 8ABF                           | 01311 8AC0 ED 01<br>01312 8AC2 DD 2B         | 8AC4 BD                | 01314 8AC7 9E 0F<br>01315 8AC9 25 E1 | 8ACB DC                       | 8ACD 6C                  | 8AD1 20                 |                 | 8AD7 AE         | 01323 8AD9 9F 47<br>01324 8ADB 20 EA                           |      |
| 1 Ogiani Listing. NON | Jake's Comment                        | RENUM start line;<br>Save for search;<br>Search for line number     | Reset variable pointers<br>;Default of 10  | Default increment Toron | default start line number<br>Parse current chr | ;If non numeric                                     | ;Save new line number<br>;Parse current chr | if end of line                        | ; If non numeric chr after "," | ;ASCII # to X<br>;Save start line #              | Parse current chr | Suntax check for "."                          | ;If non numeric after "," | ;ASCII # to X              | line                      | ;?SN Error if not end of line | ;Search for start line number ;Save start line link pointer | New line number    | Search for new line number New line link < start link? | ;?FC Error if so           | Get all new line numbers | Reset Basic link pointers | ; Search for start line number | ; Save start ine link pointer<br>:Update line number daps |            | Fill gaps with new line numbrs | Reset variable pointers                      | Goto direct mode       |                                      | lst                           | Flag 2nd pass            | Start line link pointer | ne number for i | pass?           | ;Yes, don't alter line numbers<br>;Else insert new line number |      |
|                       | Mnemonic Operand                      | LDX <\$D1<br>STX <\$2B<br>JMP \$AD01                                | JSR \$AD26<br>LDD #\$000A  | α                       | STD <\$D1<br>JSR <\$A5                         |   |   |                                       |                                | STX <\$D1  |                   |   |                           |                            | BEQ \$8A83                |                               |   |                    | 54   |                            |                          | 3- CD-                    | BSR \$8A02                     | BSR S8A91   | · 65- 67   | ን የን                           | JSR \$AD26                                   | JMP \$AC73             | line numbers                         | LDA                           | STA / Che                |                         | LDD <\$D5       | TST <\$D8       |  | 0000 |
|                       | Line Code Object<br>Numbr Addr Code   | 01219 8A02 9E D1<br>01220 8A04 9F 2B<br>01221 8A06 7E AD01          | RENUM new, start, inc 01222 8A09 BD AD26 01223 8A0C CC 000A 01224 8A0F DD O5         | 8A11 DD<br>8A13 5F      | 8A14 DD<br>8A16 9D                             | 8A18 24<br>8A1A 8D                                  |   | 8A20 27                               | 8A25 24                        | 8A27 8U<br>8A29 9F                               | 8A2B 9D           | 01240 8A2F BD B26D                            | 8A32 24                   |                            | 8A38 27                   | 8A3A BD                       | 8A3D 8D<br>8A3F 9F  | 8A41 9E            | 01249 8A43 8D BF<br>01250 8A45 9C D3                   | 8A47 25                    | 01252 8A49 8D 1C         | 8A4E BD                   | 8A51 8D                        | 8A55 8D   | 8A57 8D    | 8A5B BD                        | 8A5E BD<br>8A61 BD                           |                        | atart                                | 8A67 86 4F                    | 8468                     | 8A6B 9E                 | 8A6D DC         | 8A71 0D         | 01270 8A73 26 02<br>01271 8A75 ED 02                           | 101  |

|      | Jake's Comment                      | Copy up to open gap<br>last address copied<br>New parse pointer<br>Target line number bointer | yte   | ;MSB zero-flag<br>;LSB zero-flag                    | ;Line # MSB this point<br>;OK if non zero      | ;Else must use non zero |         | zero   | ;Else must use non zero<br>;Flag LSB really zero | ;Store LSB<br>;Parse current chr | 0. 77                    | ;Else cont line scan | <pre>;=&gt; Basic start ;Adjust for next op</pre> | ;=> next line link<br>;Current line # as renumbered | le #         | chr                         | Get byte from Basic line | ; ii end of line<br>;=1 at line gap start? | ;Yes<br>==3 at line dap start? | No, get next byte | " In         | <pre>;Print message ;Restore gap pointer</pre> | <pre>;Get undefined line pointer ;Print undefined line #</pre> | Print "IN" & current line # | Restore gap pointer | ;save gap pointer<br>;Get binary line # from gap | ;Save in FPAC1<br>;Convert to floating point       | PAC1 to ASC<br>ap pointer    | ;# line # chrs                       | Get ASCII chr   | Keep tally of chrs filled<br>Place ASCII # in gap |       |
|------|-------------------------------------|---|---|---|--|-------------------------|---------|--|--|----------------------------------|--------------------------|----------------------|---|---|--------------|-----------------------------|--------------------------|--|--------------------------------|-------------------|--------------|--|--|-----------------------------|---------------------|--|--|------------------------------|--------------------------------------|---|---|-------|
| 1000 | Mnemonic Operand                    | \$ \ \ X  |   | STA 2,X<br>STA 4,X                                  |  | LDB #1<br>INC 2.X       |         | BNE \$8B71                                     | LDB #1<br>INC 4,X                                |                                  | CMPA #\$2C<br>BEQ \$8B13 | \$881                | LDX <\$19<br>LEAX -1,X                            | LEAX 1,X  |              | X 3,X                       |                          |  | BEQ \$8BAE<br>SUBA #2          |                   | LDX #\$8BD8  | JSR \$B99C<br>LDX ,S                           |  | JSR \$BDC5                  |                     | 'n   | STD <\$52<br>JSR \$880E                            | to                           | LDB #5<br>LEAX 1.X                   | LDA , X<br>BEQ \$8BC9                                   | STA , U+  | 10000 |
| 2000 | Line Code Object<br>Numbr Addr Code | 884E BD<br>8851 9E<br>8853 9F<br>8855 35  | 8B57 8<br>8B59 A                              | 8B5B A7<br>8B5D A7                                  | 8B5F D6<br>8B61 26                             | 8B63 C6<br>8B65 6C      | 8B67 E7 | 8B6B 26  | 8B6D C6<br>8B6F 6C                               | 8B71 E7<br>8B73 9D               | 8B75 81<br>8B77 27       | 8B79 20              | 1403 8B7B<br>1404 8B7D                            | 8B7F 30<br>8B81 EC                                  | 1407 8B83 DD | 8B88 30                     | 1411                     | 1412 8B90 4A                               | 1414 8B91 27<br>1415 8B93 80   |                   | 1418 8B99 8E | 1419 8B9C BD<br>1420 8B9F AE                   | 1421 8BA1 EC<br>1422 8BA3 BD                                   | 8BA6<br>8BA9                | 1425 8BAC 35        | 1427 8BBO EC                                     | 8BB2 DD<br>8BB4 BD                                 | 1430 8BB7 BD<br>1431 8BBA 35 | 01432 8BBC C6 05<br>01433 8BBE 30 01 | 1434 8BC0 A6<br>1435 8BC2 27                            |   |       |
|      | Jake's Comment                      | 0)  | ;End-of-line pointer<br>;Bump to link pointer | RTS to caller if end prog<br>Bump over link pointer | ; Align before next chr; Save as parse pointer | Parse next chr          |         | ; II not token, get next cnr<br>;Parse pointer | ;Two-byte function?<br>;Yes, skip it             | ;RAM vector                      | Yes<br>  BLSE"?          | Yes                  | No, parse next chr<br>;Parse chr after "GO"       | ; "TO"?<br>: 1 GOTO                                 | ; SUB.:      | ;Parse possible line number | $\omega$                 | ;Cont scan of line ;Current parse pointer  | Save target line # pointer     | inter             | II (         | ;Again if not<br>;Bump past line number        | Pointer LSB to B   | jine number = 5 chrs?       | 5 chr line number   | E TO   | ;End of 5 chr gap = destination ;Copy down program | Now have 5 chr gap           |                                      | # chrs required to open gap;<br>New program end pointer | ;= copy destination<br>;Save new program end      |       |
| 0000 | t<br>Mnemonic Operand               | binary LDX 4  |   | BSR   | LEAX   | JSR                     |         |  |  | JSR                              | BEQ                      | BEQ                  | BNE \$8AED<br>JSR <\$9F                           | ~   | 4            | JSR <\$9F                   |                          |  | PSHS<br>TSB                    | LDX <\$A6         | JSR          | BLO \$   | TFR X,D  |                             | BLO \$8841          |  | LEAX B   | BRA                          | LDX <\$1B<br>STX <\$43               | 8 X   | STX <\$41<br>STX <\$1B                            |       |
| 200  | Line Code Object<br>Numbr Addr Code | line nui<br>8ADD<br>8ADF  | 8 A B A                                       | 8 A<br>8 A  | 8 A 8 A  | 8 A                     | 8AF0 27 | 8AF2 2A<br>8AF4 9E                             | 8AF6<br>8AF8                                     | 8AFA BD                          | 8AFF<br>8B01             | 8B03 27              | 8B07<br>8B09                                      | 8B0B 81<br>8B0D 27                                  | 8B0F 81      | 8B13 9D                     | 8B17 9D                  | 8B19 20<br>8B1B 9E                         | 8BID<br>8BIF                   | 8B22 9E           | 8B26 BD      | 8B29 25<br>8B2B 30                             | ω α  | 8B31 C0                     | 8B35 25             | 8B37 33 8<br>8B39 50                             | 8B3A<br>8B3C                                       | 8B3F 20 1<br>8B41 9F 4       | 8B43<br>8B45                         | 8B47 50<br>8B48 30 8                                    | 13/9 8B4A 9F 41<br>1380 8B4C 9F 1B                |       |

## THE COLORSOFT™ BUSINESS SYSTEM

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All programs require a minimum of 32K and 1 disk drive but will take advantage of 64K and multiple drives. Each package features a hi-res 51 x 24 black on green screen. 16K versions available without hi-res screen. Specify 16K or 32K versions when ordering. Future integrated packages will include: Inventory Control, Sales Analysis, Accounts Payable.

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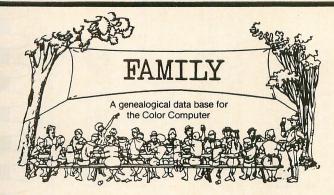


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|       | nd Jake's Comment                   | ;Compute # < 256 to B ;Baud rate delay for 300 baud ;Baud rate 0 (300) ;Yes, 300 baud ;Baud rate delay=1200 ;Baud rate 1 (1200)? ;FC Error if baud not 0 or 1 ;Setup baud rate delay ;Get lst I/P block to buffer ;-3 ;Set device # = -3 | ;DLOAD"M"?<br>;If so<br>;?SN Error if not EOL<br>;ASCII file?<br>;No, FM Error<br>;Initialize Basic cold<br>;?FM Error                                      |   | ; Normal CLOADM<br>;File type<br>;Set device nun<br>;Read block to<br>;File type = bi<br>;?FM Error if r<br>;Zero constant                        |                                       | ;EOF marker; ;EOF marker; ;Hoput 2-byte address to D; ;Add offset; ;Load address ;to X; ;EOF; ;Close if so; ;Get I/P chr from buffer; ;Store in mem; ;Went in OK?   |  |
|-------|-------------------------------------|--|---|---|---|---------------------------------------|---|--|
|       | Mnemonic Operand                    | JSR \$B70B<br>LDA #\$B0<br>TSTB<br>BEQ \$8C42<br>LDA #\$2C<br>DECB<br>LBNE \$\$E44<br>STA \$\$C00<br>PSHS A<br>LDA #\$FD   | FULS A<br>TST ,8+<br>BNE ,845C7<br>TSTB \$A5C7<br>TSTB \$A5C7<br>TSR \$A5C7<br>JMP \$A616   | JSR   |   |                                       | PSHS A BSR \$8 CBF PSR \$8 CBF PSR \$8 CBF A PSR \$8 CBF A PSR \$9 DJ X LDA \$1 CBF A PSR \$8 CBF A PSR |  |
| 10000 | Line Code Object<br>Numbr Addr Code | 01492 8C33 BD B70B<br>01493 8C36 86 B0<br>01495 8C38 27 07<br>01496 8C38 86 2C<br>01497 8C3D 5A<br>01499 8C3E 1026 2808<br>01499 8C42 97 E6<br>01500 8C44 BD 8CD0<br>01501 8C47 34 02<br>01502 8C49 86 FD                                | 8C4D 35<br>8C4F 6D<br>8C51 26<br>8C53 BD<br>8C56 5D<br>8C57 27<br>8C57 27<br>8C5C 7E  | Extended CLOADM<br>01513 8C62 9D 9F<br>01514 8C64 81 4D<br>01515 8C66 1026 182E<br>01516 8C6A 0F 78<br>01517 8C6C 9D 9F<br>01518 8C6E BD A578<br>01519 8C71 BD A648<br>01520 8C74 7D 01E4 | 8C77<br>8C77<br>8C80<br>8C83<br>8C83<br>8C83<br>8C83<br>8C83<br>8C83  | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 80<br>80<br>80<br>80<br>80<br>80<br>80<br>80<br>80  |  |
|       | Jake's Comment                      | Current Basic mid line pointer Fild 5 chr fill? Yes, continue line scan Hold next byte pointer Get source to fill gap from Copy to crrnt posn til progend Restore next byte pointer Continue line scan  """ Space/end                    | Get # < 65536 to FPAC1<br>>> HEX\$ string destination<br>} hex digits to do = 4<br>  Save # characters of hex<br>  Initialize hex digit<br>  bits per digit | into B ; not a bits; ; cont until done; ; cont until done; ; Any # in B? ; No, do ASCII ; # characters left to do; ; This last character? ; Yes, place in string; ; At start of string?   | Yes, suppress leading zeroes convert # to ASCII 5.99. No, # is OK Flse convert to A-F into string & bump into string with zero is chrs left to do | nex<br>etur<br>ing-<br>inf            | Close files   Init  |  |
|       | Mnemonic Operand                    | BRA \$8BBE LEAX 'U TSTB BEQ LEAY 'U LEAY 'U LEAY 'V LEAY 'Y LEAX 'Y BRA \$8B8C LEAX 'Y BRA \$8BBC  | JSR \$B740<br>LDX #\$03D9<br>LDB #4<br>PSHS B<br>CLRB B<br>CLRB A4<br>ASL <\$53   | met m et te   | BEQ \$8C0B<br>ADDB #\$30<br>CMPB #\$39<br>BLS \$8C07<br>ADDB #7<br>STB ,X+<br>CLR ,X  | m ro                                  | USR 7-429 CLR 7-48 CMPA #54D BNE 58C25 STA 58 USR 59F USR 549F USR 54578 USR 54578 USR 58C44 USR 58C60 CMPA #52C BEQ 58C44  |  |
| P     | Object<br>Code                      | 20 F5<br>330 C4<br>27 BE<br>31 C4<br>33 C5<br>33 C5<br>30 A4<br>20 B3<br>4C<br>20 B3   | BD B740<br>8E 03D9<br>CG 04<br>34 04<br>5F<br>86 04<br>08 53  | 26 F8<br>26 F8<br>26 0A<br>26 0A<br>4A E4<br>4A E4<br>27 05<br>8C 03D9  |   |                                       | 6F B A429<br>6F B A429<br>81 40<br>70 604<br>70 604<br>70 604<br>70 604<br>70 604<br>70 604<br>70 606<br>70 606<br>70 606<br>70 606<br>70 606<br>70 606<br>70 70 70 70 70 70 70 70 70 70 70 70 70 7   |  |

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| 200000   | Jake's Comment                      | <pre>;# errs, chksm, spc for I/P adr<br/>;Hold stack pointer in Y</pre>                | Ore than 5 e // P byte // P specified e or I/O e to O/P haracter | ;0/P RS232 chr with chksm<br>;Done all filename?<br>;1f not<br>;0/P chksm then I/P byte = \$C8<br>;1f bad | yte with                                 | ;Save file mode<br>;Get checksum<br>;If bad checksum or I/O<br>;Pull # errors + checksum<br>;Pull type & mode | Bump # errors  Get current # errors  Less than 57  RTS if less than 5  Byte to 0/P  O/P RS232 byte   | ;Save required input byte;Clear chksm, o/p then i/p byte;If bad I/O;This the byte required;Exit with I/O or cmpare status   |  | ;Clear Chrsm, o/p then 1/p byce<br>;RTS if bad I/O<br>;Set flags as per compare | Get RS232 input byte;RTS if bad I/O;Checksum should be zero  | ;Input RS232 byte<br>;Save status + input byte                |
|----------|-------------------------------------|--|--|---|--|---|--|---|--|---|--|---|
| 3        | Operand                             | A,B,X  | \$8048<br>#\$8A<br>\$8058<br>\$8018<br>#\$0102                   | \$8E04<br>#\$01DA<br>\$8D26<br>\$8D62<br>\$8D62<br>\$8D1B   | \$801B<br>2,Y<br>\$8072<br>\$8072        | 3,Y<br>\$8D6B<br>\$8D1B<br>2,S<br>A,B,PC  | Y Y Y X 8 8 8 0 6 A 8 8 8 0 C S 8 6 1 9 \$ 8 6 1 9   | A<br>\$8DB8<br>\$8D60<br>, S<br>A, PC   | 1,Y  | \$806A<br>\$806A<br>#\$C8   | \$8D72<br>\$8D6A<br>1,Y  | \$8DBC<br>CCR,A   |
| R        | Mnemonic                            | PSHS<br>LEAY<br>BRA  | BSR<br>LDA<br>BSR<br>BNE<br>LDX<br>LDX                           | JSR<br>CMPX<br>BNE<br>BSR<br>BNE  | BNE<br>STA<br>BSR<br>BNE                 | STA<br>BSR<br>BNE<br>LEAS<br>PULS   | errors<br>INC<br>LDA<br>CMPA<br>BLO<br>LDA<br>JSR<br>JMP   | fied byte<br>PSHS<br>BSR<br>BNE<br>CMPA   | input \$C8<br>LDA                          | BSK<br>BNE<br>CMPA<br>RTS   | BSR<br>BNE<br>LDA<br>RTS   | ksum<br>BSR<br>PSHS   |
| 100      | Code Object<br>Addr Code            | 8D15 34 16<br>8D17 31 E4<br>8D19 20 02   | 80<br>86<br>80<br>26<br>8E<br>8E                                 | 8D28 BD 8E04<br>8D2B 8C 01DA<br>8D2E 26 F6<br>8D30 8D 30<br>8D32 26 E7                                    | 26<br>A7<br>8D<br>26                     | 803E A7 23<br>8040 8D 29<br>8042 26 D7<br>8044 32 62<br>8046 35 86  | no more than 5 er<br>8D48 6C A4<br>8D48 6C A4<br>8D4C 81 05<br>8D4E 25 1A<br>8D52 BD 8EC<br>8D52 BD 8EC<br>8D52 BD 8E0C<br>8D57 7E A619  | ing<br>34<br>80<br>26<br>A1<br>35   | ssum then A6 21                            | 8D64 8D 52<br>8D66 26 02<br>8D68 81 C8<br>8D6A 39                               | Get RS232 checksum byte 01635 8D6B 8D 05 01636 8D6D 26 FB 01637 8D6F A6 21 01638 8D71 39                                   | Get RS232 byte, do checksum 01639 8D72 8D 48 01640 8D74 34 03 |
| B        | Line<br>Numbr                       | 01594<br>01595<br>01596  | 01597<br>01598<br>01599<br>01600<br>01601                        | 01603<br>01604<br>01605<br>01606<br>01607   | 01609<br>01610<br>01611<br>01611         | 01613<br>01614<br>01615<br>01616<br>01617   | Check<br>01618<br>01619<br>01620<br>01621<br>01622<br>01623  | Output<br>01625<br>01626<br>01627<br>01628<br>01628   | Output<br>01630                            | 01632<br>01633<br>01633<br>01634  | Get RS:<br>01635<br>01636<br>01637<br>01638  | Get RS:<br>01639<br>01640                                     |
| 00000000 | Operand Jake's Comment              | \$8CCD ;210 Error if not -1,Y ;Done all? \$8CB1 ;Continue if not \$8CB1 ;Do next block | ;Get #1 ;Get I/P   | \$A176 ;Get I/P chr<br><\$70 ;Buffer empty?<br>\$8CC5 ;RTS if not<br>\$A619 ;Else ?10 Error               | ; TYP<br>; TYP<br>; = \$F;               | RS2<br>RS2<br>YPe<br>e<br>cess  | <pre> &lt;\$7E  ;= I/O address 1, U   ;Add one 6;7E  ;Restore I/O address #\$01DA ;=&gt; input buffer \$8D7C  ;Read R232 block to buffer \$A644  ;Setup # bytes, k refrsh I/P ptr \$</pre> | \$A176<br><\$6F ; Jovice number<br>\$58D1 ; J3<br>\$8D01 ; RTS if not<br>\$101 return<br><\$70 ; Set I/O buffer unflushed<br><\$79 ; More chrs to extrct frm buffr?   | DDO2 ;Yes<br>:70 ;Else flag buffer = empty | B,X,Y,U (1/0 buffer pointer (574 ) Get chr from hiffer. himn ntr                | ; Hold chr; Save new ptr; ; Save new ptr; ; 1 less chr in buffer ; If buffer has more ; Fead next RS232 I/P block x.v.n.pc | ; Initialize # errors   |
| B        | Mnemonic                            | BNE SE LEAY - BNE SE BRA SE  |  | JSR \$1<br>TST <\$<br>BEQ \$8<br>JMP \$1  | rn et                                    | LDU <\$<br>BSR \$8<br>PULS A<br>LDB #\$   | LDU <\$<br>LEAX 1,<br>STX <\$<br>LDX #\$<br>USR \$8  | mo A S  | BNE<br>COM<br>COM<br>CS                    | buffer<br>PSHS<br>LDX<br>LDX  | to to  | type<br>CLRA  |
| 1000     | Line Code Object<br>Numbr Addr Code | 01548 8CB7 26 14<br>01549 8CB9 31 3F<br>01550 8CBB 26 F4<br>01551 8CBD 20 DC           | 2-byte address to<br>8CBF 8D 00<br>8CC3 1E 89<br>8CC5 39         | 01556 8CC6 BD A176<br>01557 8CC9 0D 70<br>01558 8CCB 27 F8<br>01559 8CCD 7E A619                          | 8CD0 8D<br>8CD2 34<br>8CD4 4C<br>8CD5 27 |   |  | Called during character 1 01575 8CF1 96 6F 01576 8CF3 81 FD 01577 8CF5 26 0A 01579 8CF9 0F 70 01580 8CF9 0F | 8CFD 26<br>8CFF 03<br>8D01 39              | 8D02 3<br>8D02 3<br>8D04 9  | 01587 8D08 34 02<br>01588 8D0A 9F 7A<br>01589 8D0C 0A 79<br>01590 8D0E 26 02<br>01591 8D10 8D D0<br>01592 8D12 35 P6       | filena<br>8D14 4  |

## SUPER SCREEN



- A big 51 character by 24 line screen.
- Full upper and lower case characters.
- · Easily combine text with hi-res graphics.
- PRINT @ is completely functional on
- the big screen.

  The powerful ON ERROR GOTO is fully implemented.
- · Auto-key repeat for greater keyboard convenience.
- Control codes for additional functions. · Works with 16K, 32K or 64K computers.
- Available on disc or cassette
- Works with extended and/or disc BASIC.

#### 51 CHARACTERS BY 24 LINE DISPLAY

Super Screen is a powerful, machine language program that significantly upgrades the performance and usefulness of 16K or greater, Extended and Disc Basic Color Computers. The standard Color Computer display screen is totally inadequate for serious, personal or business applications so Super Screen replaces it with a brand new, 51 character wide by 24 line screen including full upper and lower case characters. Instead of a confusing checkerboard appearance, you now have true lower case letters along with a screen that is capable of displaying 1224 characters. The difference is startling! Your computer takes on new dimensions and can easily handle lines of text that were simply too long and complex to display on the old screen.

#### COMBINE TEXT WITH HI-RES GRAPHICS

You can now write truly professional looking programs that combine text with hi-res graphics. Super Screen allows you to create graphics displays with the Basic LINE, DRAW and CIRCLE statements and then notate the graphics with descriptive text. You can even use PRINT @ if you wish for greater programming convenience. Super Screen's versatility will amaze you.

#### PRINT @ IS FULLY IMPLEMENTED

The PRINT @ statement is a valuable asset to the programmer when formatting text on the screen. The standard Color Computer will report an error if you specify a location higher than 511 but Super Screen allows locations all the way to 1223! You get a big screen and a powerful formatting tool as well. Of course, Super Screen also supports the CLS command allowing you to clear the big screen using standard Basic syntax

#### ON ERROR GOTO

That's right! Super Screen gives you a full implementation of ON ERROR GOTO including the ERR and ERL functions. Now you can trap errors and take corrective action to prevent crashed programs and lost data using the same standard syntax as other computers. The ON ERROR GOTO capability overcomes a serious deficiency of Color Computer Basic and greatly improves your capability to handle sophisticated tasks. All well written, 'user friendly' programs use error trapping techniques and yours can too! Now that's power!

#### **AUTO KEY REPEAT**

No more frustration as you edit a long line in your Basic program; just hold the space bar down and automatically step to the desired position in the line. Need a line of asterisks? Hold the key down and auto repeat will give them to you. Those of you who spend many hours at your keyboard will appreciate this outstanding addition to Super Screen's long list of impressive capabilities

#### CONTROL CODES FOR ADDITIONAL FUNCTIONS

Super Screen recognizes several special control code characters that allow selection of block or underline, solid or blinking cursor and other functions. You can 'Home Up' the cursor or you may erase from the cursor to the end of a line or to the end of the screen just like many other computers. These special codes give you an extra dimension of versatility and convenience that put Super Screen in a class by itself.

#### AND MORE GOOD NEWS...

Super Screen comes with complete, well detailed instructions and is available on cassette or disc. It adjusts automatically to any 16K or greater, Extended or Disc Basic Color Computer or TDP-100 and uses only 2K of memory in addition to the screen memory reserved during power up. Guaranteed to be the most frequently used program in your software library...once you use it, you won't be without it! Super Screen's low price will really please you; only \$29.95 on cassette or \$32.95 on disc!

### 64K Memory Expansion Kit

All parts and complete instructions \$64.95

# NEW SUPER BUG



Mark Data Products SUPER BUG is a powerful, relocatable machine code monitor program for your Coco. If you are a beginner, the program and documentation are an indispensable training aid, helping you to gain a better understanding of your Color Computer and machine code programming. If you are an accomplished computerist, SUPER BUG's capabilities, versatility and convenience will prove invaluable during programming and debugging.

SUPER BUG offers so many outstanding features that we are unable to list them all in this limited space, hex and alpha numeric memory display, modify, search and test; full printer support with baud rate and line feed select; up to 220 breakpoints; mini object code disassembler; 64K mode setup; decimal, hex and ascii code conversion routines and extensive documentation. Only \$29.95 on cassette or \$32.95 on disc.

#### **ORDER ENTRY SYSTEM**

The Mark Data Products sales order processing system will give a fast, efficient means to enter orders, print shipping papers and invoices, prepare sales reprots, and monitor receivables. The system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer, and one or more disc drives.

The MDP order entry system is a family of programs which operate interactively by means of a "menu" selection scheme. Up to 900 products may be defined and a single disc system can hold over 600 transactions. When the operator selects a task to be performed, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary paperwork including shipping and invoice forms, daily sales reports, a monthly (or other period) sales report and a receivables report.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Produces a traceable invoice.
- Handles receivables as well as closed orders.
- In capable of future expandability

This accounting software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. For just \$99.95.

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- Is easy to customize for specific user requirements.
- Immediately updates the chart of accounts
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Next scan bit left No crry flg if not done 8 bits; Pull scan bit ptr

;Else current scan bit = on

;...into carry flag; If zero

Jake's Comment

Decrement main timeout count; RTS if still time; Pull return

;Align stack ;Set I/O flag = bad ;Entry point for delay\*2

;Get baud rate delay

;NOP ;Finished? ;Go again if not

;=> RS232 input in bit 0; Received bit to carry flag

;Bump timeout sub-count;RTS if OK

| Operand                       | \$8DDE  | \$8DD4<br>1,S<br>CCR,B,X,PC  | \$FF22                                      | 1, X<br>\$8DF6                  | \$8DF6   | CCR, B, X                     |                                      | \$8DF9<br>A        | \$8DFD             | \$8DFD  | 2110       | A       | 1, Y               | A<br>CCR, A, B  | \$8DF7    | \$8DF7                  | #1<br>B            | 2,5  | \$8E25                    | \$8DF7       | \$8E1D<br>#2       | SFF20<br>1,S<br>CCR,A,B,PC |                             |
|-------------------------------|---|--|---|---------------------------------|--|-------------------------------|--------------------------------------|--------------------|--------------------|---|------------|---------|--------------------|---|-----------|-------------------------|--------------------|--|---------------------------|--------------|--------------------|----------------------------|-----------------------------|
| Mnemonic                      | RORB<br>BHS<br>ORA<br>ASL                           | BHS<br>LEAS<br>PULS  | LDB   | LEAX<br>BNE                     | DECA<br>BNE<br>LEAS  | PULS<br>INCA<br>RTS           |                                      | BSR<br>PSHS        | BRN                | BNE   |            | PSHS    | STA                | PULS  | BSR       | BSR<br>CLR<br>BSR       | LDB                | ANDA   | LDA                       | BSR          | BHS                | STA<br>LEAS<br>PULS        |                             |
| Code Object<br>Addr Code      | 56<br>24<br>AA<br>68                                | 8DE0 24 F2<br>8DE2 32 61<br>8DE4 35 95                             | Get RS232 input level<br>01699 8DE6 F6 FF22 |                                 | 8DEE 4A<br>8DEF 26 05<br>8DF1 32 62  |                               | 100                                  | BDF7 8D<br>8DF9 34 |                    | 8DFF 4A<br>8E00 26 FB<br>8E02 35 82   | 20 60 7070 | 34      | A7<br>A7           | 8E0A 35 02<br>8E0C 34 07<br>8E0F 1A 50  | 88        | 7F<br>8D                | 34                 | 8EIF A4 E4                                       |                           | 89           | 24 86              | 8E33 32 61<br>8E35 35 87   |                             |
| Line<br>Numbr                 |   | 01696<br>01697<br>01698  | Get RS2<br>01699                            |                                 | 01703<br>01704<br>01705  |                               |                                      | T                  |                    | 01713<br>01714<br>01715   |            | L       |                    | 01719   |           | 01/23<br>01724<br>01725 |                    |  |                           |              |                    | 01/3/<br>01738<br>01739    |                             |
| Operand Jake's Comment        | 1,Y ;Checksum with total 1,Y ;New checksum CCR,A,PC | ;Init # errors<br>A,B,X,Y,U ;#errs, cksm,=>i/p buf,blklen,0<br>7,S | 6,8<br>7,8<br>V oi reta trans thou v        | BB ;Check no more than 5 errors | #597 ;Required byte<br>\$8D58 ;O/P then I/P specified byte<br>1.15 bad byte or I/O |                               | \$8E04 ;0/P RS232 byte with checksum | ; If I             | ) TI               | 2,Y ;=> input buffer<br>#\$80 ;= 128 bytes to input<br>\$8772 .Ga+ RS/32 byte with checkenm | 36         |         | Get RS232 checksum | \$8D89 ;II I/O Or checksum error<br>4.S ;Pull #errs, chksm,=> I/P buffr<br>A.R.PC :a=hlklen |           |                         | x, x               | #\$50 ;Disable interrupts <\$E7 ;Timeout counter | <pre>&lt;&gt;&amp;A</pre> |              | 8DF9 ;             |                            | \$FF22 ;Get RS232 input bit |
| Mnemonic                      | EORA<br>STA<br>PULS                                 | buffer<br>CLRA<br>PSHS<br>ASL                                      | ROLLSR                                      | BRABSR                          | LDA<br>BSR<br>BNE  | LDA<br>BSR<br>LDA             | BSR                                  | BNE                | STA                | LDB   | BNE        | DECB    | BSR                | LEAS  |           | CLR                     | PSHS               | LDA  | BSR                       | BSR          | BSR                | CLRA                       | LDB                         |
| e Code Object<br>br Addr Code | 41 8D76 A8 21<br>42 8D78 A7 21<br>43 8D7A 35 83     | to   | 8D81 69<br>8D83 64                          | 8D87 20<br>8D89 8D              | 8D8B<br>8D8D<br>8D8F   | 8D91 A6<br>8D93 8D<br>8D95 A6 | 8D97 8D                              | 809B 26<br>809D 80 | 8D9F 26<br>8DA1 A7 | 8DA3 AE<br>8DA5 C6<br>8DA7 8D   | 8DA9 26    | 8DAD 5A | 8DB0 8D B          | 8DB4 32<br>8DB4 32<br>8DB6 35   | De222 but | 8DBA 8D 50              | 8DBC 4F<br>8DBD 34 | 8DC1 96  | 8DC5 8D<br>8DC7 24        | 8DC9<br>8DCB | 8DCD 8D<br>8DCF C6 |                            |                             |
| Line                          | 999   | Read<br>016,<br>016,   | 016   | 016                             | 016  | 016                           | 016                                  | 016                | 016                | 016   | 016(       | 010     | 010                | 016   |           | 016                     | 016                | 910  | 016                       | 016          | 016                | 0168                       | 910                         |

Disable interrupts
Baud delay\*2
Baud delay\*2
Drop voltge level for strt bit
Baud delay\*2
Initialize B to point at bit 0

Scan next bit to the left If not done 8 bits

;...for mark;Pull bit pointer

Raise level ...

Byte to O/P; Current bit=1?; No O/P zero bit; Flse O/P a one bit; RS232 data O/P; Baud delay\*2

;Save bit pointer

E.P. to O/P byte & form chksm ;Update checksum

Restore it Realign stack SEND FOR FREE CATALOG



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#### ABC'S IN COLOR

In the ABC program, all 26 letters spring up in color to the familiar ABC tune. Then, colorful detailed pictures depicting each individual letter of the alphabet appear one by one. Your child's fascination will mount as he or she correctly presses the letter on the keyboard and is rewarded with a musical tune before the next detailed picture is drawn line by line onto the screen: AIRPLANE for A, BUS for B, CLOWN for C and so on to ZEBRA for Z. Truly a must program for the preschool to first grade age

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#### SPELLING BEE

The word is pronounced vocally and it is up to you to type in the correct spelling. If wrong, the computer will be your friend and flash the word on the screen for just an instant. OK! Try typing the word in again. STILL WRONG! The computer wants success and allows you to see the word again this time a little longer. If you just can't spell the word, the computer realizes you need to learn to spell the word and leaves the word on the screen for you to copy. Try your best and the computer has a surprise for your reward!

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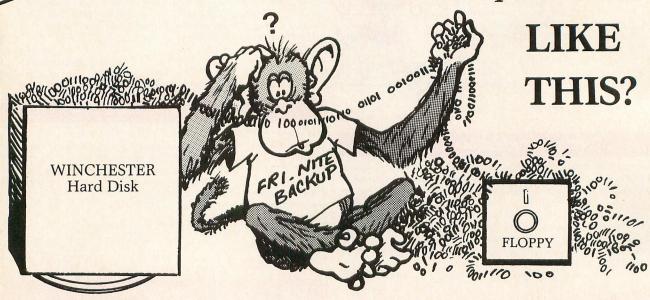
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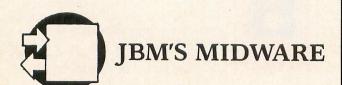
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Part IV in a series on disks.

# The Devil's Disk Editor

Eds. Note: In March Bill presented the first part of The Devil's Editor. This month he explains how it works. Refer to the March, 1984 issue for the program.

WON'T GO INTO A LENGTHY discussion of the program here, but will give you a thumbnail sketch of how it works.

The file dump portion of the program assembles the file name from the user input and then reads in the nine sectors of the directory from disk, one sector at a time. A search is made of each directory sector to find the file named. If the file name is found, the file location is picked up from the fourteenth byte of the directory entry. The FAT (File Allocation Table) is then read into memory as string variable P\$. The first sector of the file is then read and displayed.

The sector dump portion of the program assembles the drive number, track number, and sector number and then reads and displays the desired sector.

The GOTO next block portion of the program increments the offset by 64 bytes, reads in the next sector if necessary (every fourth display), and displays the next block. If a named file is involved, the process is similar, but the next granule is found if necessary.

The GOTO previous block portion of the program decrements the offset by 64 bytes, reads in the previous sector if necessary (every fourth display), and displays the previous block. If a named file is involved, the process is similar, but the previous granule is found if necessary.

The modify memory mode portion of the program uses variables CL (current line) and CC (current character position) to display the cursor. Checks are made of digits entered to make certain they are valid hexadecimal digits. Pushing the Enter key causes a write to the current by William Barden, Jr.







16K Disk Extended Color Basic

sector after the data is assembled from the screen display.

The read in and display current sector subroutine uses DSKI\$ to read in two strings of 128 bytes each, representing the current sector. 64 bytes of one of the strings is displayed, depending upon the current offset.

The list of variables and their use follows:

A\$= temporary string variable

A= temporary variable

AC = character in modify mode

AL = left character in modify mode

AR = right character in modify mode

C= column in modify mode, others

**CC**= current character position — used in modify mode

**CL**= current line — used in modify mode CM = temporary variable — holds CP in

modify mode CP= cursor position — used in modify

mode

D= disk drive number, 0 to 3

F\$= file name for named file

F1\$= name of file in start file

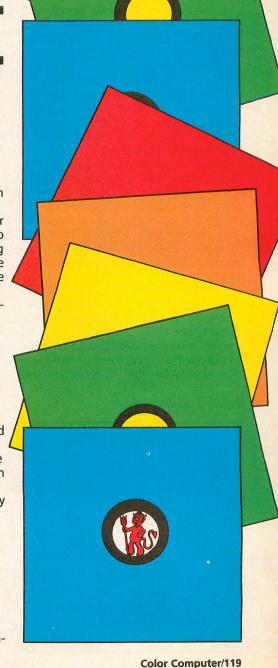
F2\$ = extension of file in start file

FT = holds FAT index

I= temporary variable

J= temporary variable

LS = -1 if no current sector NS= number of sectors in current gran-



ule of named file — 9 if not last granule, 0 – 9 if last granule

 $\mathbf{O} = \text{offset}, 0 \text{ to } 3$ 

**OF** = original FAT index

**P\$** = portion of FAT for named file

R= row in modify, others

RN = record number of named file

\$\$= current directory sector in start file

**S0\$ – S3\$** = hold 64 bytes each of current sector read in

S = sector number, 1 to 18

**SH\$**= holds first 128 bytes in modify, others

**SL\$**= holds last 128 bytes in modify, others

T= track number, 0 to 34

## About That Killed File

I have a description of file formats and also hints and kinks about using Devil's Disk Editor in its manual, but let's tackle the problem of killed files here. How to restore a killed file?

The Disk Operating System kills a file by "zeroing out" the first byte of the directory entry, as shown in Figure 1. It also deallocates the FAT entries, changing them from links to \$FF. The \$FF indicates that the granule is unused.

Before doing anything, back up the disk containing the killed file and use the back-up disk for the following operations. By the way, the killed file is still intact only if you haven't done any other disk writes after killing the file. If you have done disk writes after the kill, all or a portion of the file may have been overwritten!

To restore a killed file, you must first find every granule that contains the file. This must be done by searching the disk sectors, but here's a hint of where to begin: Using the Devil's Disk Editor, look in the directory entry for your killed file. You should be able to recognize the

name. Change the first character of the name back to the original, making certain that the proper name is shown in the ASCII portion of the display. Rewrite the directory sector with an Enter after the modify mode.

Now find the "location" value from the fourteenth byte of the directory entry. Divide this value by two. The quotient is the track number and the remainder of zero or one defines the granule in the track, either the granule starting at

"Remember that the Devil's Disk Editor is a two-edged utility."

sector one or the granule starting at sector ten. Add one to the track number if the track is above track 16 to compensate for the two directory granules.

Now display the granule in the track and sector you've found. There's a good chance the granule may hold the entire file if the file is a short Basic program or other short file. Use a listing of your program for comparison. If you're looking for a Basic program, remember that the Basic commands will be "tokenized" to one-byte form, so you won't be able to recognize the commands. (See my IJG book, How to Do It On the TRS-80, for more information on tokens.)

If the first granule does not contain the entire program, you'll have to continue the search in other granules. Jot down the track, sector number of the first granule and then look at all FAT entries (track

17, sector 2) that contain an \$FF. Divide by two as before to find the corresponding track and sector number, remembering that values for tracks should have one added if the track is greater than 16. Remember that granules start on sector one or ten of each track; you should be able to investigate only the first block of the first sector of a granule to see if the data there looks like your killed file. Jot down every granule that is used by track and sector number.

When you have found every granule that was previously used in your file, you have one more chore: Look at the last granule and find the last sector used to hold your file. You should be able to do this by comparison with a Basic or other listing. You'll have from one to nine sectors that are used in this last granule.

You'll now have a list similar to this:

track 20, sector 1 track 22, sector 10 track 27, sector 1, 5 sectors used

The first granule used should already be in the directory entry, so you'll be working only with FAT entries. Read in the FAT. Now convert the track, sector number to granule numbers by subtracting one from any track over 17; and multiplying the adjusted track number by two and adding the sector number.

Now modify the FAT so that each FAT entry points to the next granule. In the example above, track 20 sector 1 is granule 38, or the thirty-eighth byte of the FAT, counting from zero. Change the thirty-eighth byte to hold 43, the granule encoding for track 22, sector 10. Now change granule 44, the forty-fourth byte of the FAT, to hold 52, the granule encoding for track 27, sector 1. Now go to FAT entry 52, the last granule, and make the last entry of \$C5. The \$C portion of the code says that this is the last granule of the file, while the numeral five says that there are five sectors in the file. For one-granule files, only this last step has to be performed, to denote how many sectors are in the last portion of the file.

You should now be able to read in the file normally under Basic. Good luck!

There are other tricks that can be done with DDE or similar disk editors, including formatting data as ASCII files, allocating large file areas, and repairing unloadable programs. Get some practice before attempting these operations and remember that DDE is a two-edged utility.

And now for Cesar Frank's famous Second Symphony, the so-called "Computational Symphony." Let's see...oops, I forgot the first violinist in Line 3430...

Figure 1. Kill Action

|    | #:0<br>REC# |    | <b>±</b> : 17 | SECT | OR#: | 3  |    |         |  |
|----|-------------|----|---------------|------|------|----|----|---------|--|
| 00 | 41          | 47 | 49            | 43   | 53   | 51 | 20 | AGICSQ  | THIS BYTE IS ZEROED FOR A KILL   |
| 42 | 51          | 53 | 00            | 00   | 24   | 00 | 52 | BAS\$.R | and the later of t |
| 00 | 00          | 00 | 00            | 00   | 00   | 00 | 00 |         | THIS BYTE STILL DEFINES THE FIRST  |
| 00 | 00          | 00 | 00            | 00   | 00   | 00 | 00 | ·       | FAT ENTRY AND  |
| 40 | 41          | 42 | 45            | 4C   | 53   | 20 | 20 | LABELS  | GRANULE (TRACK 12  |
| 42 | 41          | 53 | 00            | 00   | 25   | 00 | AB | BAS%    | SECTOR 1)  |
| 00 | 00          | 00 | 00            | 00   | 00   | 00 | 00 |         |  |
| 00 | 00          | 00 | 00            | 00   | 00   | 00 | 00 |         |  |

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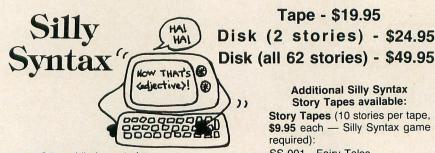
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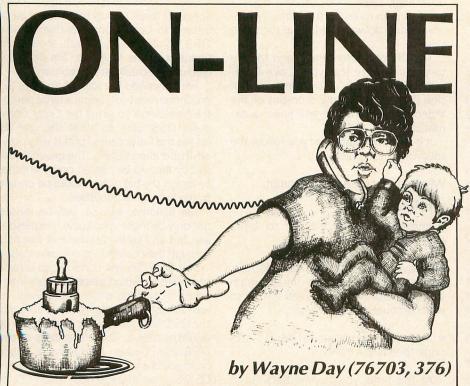
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NE MOST POPULAR FEATURE of the Color Computer Special Interest Group (CCSIG) on CompuServe is the SIG/Access database where you'll find hundreds of programs already programmed, ready to run as soon as you retrieve them from the database. This month, we'll get acquainted with the Access procedures.

Think of SIG/Access as a gigantic electronic library containing books (text files and program documentation), paintings (graphics screens and picture generating programs), records (music files), as well as general programs. Your membership in the SIG is your library card, since no additional fees are charged by CompuServe for access to any of the CCSIG's features.

SIG/Access can be reached by using the XA command either at the SIG menu, or at the FUNCTION: prompt. The system will then ask you which database you want to go to. Select from one of these, depending on your interests:

XA 0 General programs and files

XA1 Reviews

XA2 Graphics and pictures

XA3 Music files

XA4 Club news and information

**XA5** Reserved for future use

XA6 OS/9, Basic 09, and Flex

For this example, let's say we're interested in the General program section,

XAO, because it contains the largest number of programs and files.

Enter XA at the SIG menu to go into the SIG/Access section of the SIG. You'll then be asked to select one of the databases. Select 0 to enter the XAO database.

Since CIS accepts commands that are chained together, you could have entered XAO at the main SIG menu to accomplish the same thing, bypassing the second selection menu.

Once in XAO, we need to know what's in the library before we can check anything out, so let's do some exploring.

The CAT command will print out a listing of file names of programs in the database, along with the user ID of the person who submitted them, as well as the date the file was submitted and the length of the file. Files are named in two parts: the file name itself, and the extension, i.e., PROGRAM.BAS. Those users with disk systems are already familiar with the concept of an extension, but for cassette users who haven't had any experience with extensions, just think of them as an additional three-letter description not of the program *itself*, but describing how the program is stored or to be used.

For example, we have a set of standardized extensions for use on the CCSIG:

**.CC** denotes a Radio Shack Basic program designed to be run on a Color Computer.

**.BIN** denotes a binary file, usually a machine code program, but could be any block of memory such as a graphics screen.

**.DOC** documentation: a text file containing the instructions for using a particular program or programs.

.TXT denotes a text file. This could be documentation or a file that gives you instructions on how to modify your Color Computer to 64K.

**.SRC** denotes an assembler source file. This file must be run through an assembler such as Macro-80C or EDTASM+ and will produce an assembly language program.

.PIX a picture generating program. These can be files which are self-contained Basic programs which, loaded and run, will produce a high-resolution graphics page on your screen, or they can be "line printer art" — series of data statements which must be read and printed on a printer.

.MUS are musical data files which, when used with the KOMPOS.CC program in SIG/Access, will produce fourpart harmony music on your Color Computer. Unlike hardware music generators, the KOMPOS series of music files are all under software control, and require no additional hardware to use.

#### **Back To Business**

Back in XAO we're still not getting a clear picture of what's available in the database since the file names by themselves can be a bit cryptic, so let's check out the index in a different way.

Enter the command BRO (for BROwse), and you will start receiving a list of all of the files available in the particular database you're in, a complete description of the file, and an option to read or download the file at the end of the description.

If you want to read the file, enter R and the file will be typed out for you (without the system opening or closing your buffer, should your particular terminal program have a settable buffer).

The D (for Download — which means to transfer to your terminal) option will start a series of events that varies depending on which terminal program you are using. For example, users of Compu-Serve's Vidtex program will be prompted to supply a file name for the program that's about to be saved on the user's tape or disk, and then the program is automatically saved for the user.

If you are using one of the smart terminal programs available for the Color Computer that does not support the CompuServe B protocol (used to guaran-

tee error-free uploading and downloading of files), CIS will send you two special control characters, used to mark the beginning and the end of the file you're downloading.

On COLORCOM/E, for example, the CONTRL-R (\$12) character sent by CIS marks the start of an area in the received data buffer, which is then followed by the file itself. This character is used by the program to automatically find the program when you attempt to save it later.

After the file is sent, CIS will send a CONTRL-T (\$14) that marks the end of the file. Again, as an example, COLORCOM/E uses this character to denote the end of

the file that is being saved.

Most of the so-called smart terminal programs use some sort of control characters to mark the start and end of a file, and the CONTRL-R / CONTRL-T set of control characters used by CIS is the most common, found not only on CIS but on most Color Computer bulletin board systems as well. You might keep that in mind if you're in the market for a terminal program that has a few more "smarts" than Videotex, which most folks start out with because it is sold at all Radio Shack stores.

Since Tandy did not write Videotex to easily support downloading of data to a cassette, there are some special considerations to keep in mind when using Videotex:

- Videotex will not download binary files (those with the extension of .BIN or .IMG)
- 32K Color Computer users should be using Videotex Ver. 1.2, otherwise they will not be able to download files from Access. This is because Ver. 1.0 and Ver. 1.1 of the Videotex ROMpak recognize only a 4K or a 16K Color Computer. If you have a 32K or 64K Color Computer and have Ver. 1.0 or Ver. 1.1 of the Videotex ROMpak, check with your local Radio Shack store about acquiring the current Ver. 1.2.
- 16K Color Computer Videotex users will only be able to download files of up to 6,400 bytes. 32K or 64K Color Computer users with Videotex Ver. 1.2 will be able to download files of up to 22.7K bytes.

Videotex users who want to download files may browse through the files just as do other users. When you decide to download a file there will be a pause while your computer is checked by the CIS system, then you will be asked if your computer has at least 16K of memory. You must have at least 16K of RAM to

download, since a 4K machine doesn't have enough room for the Videotex program and a downloaded file at the same time.

The CIS computers then send the file to you in a form that your Color Computer understands. After the transmission is complete, you'll drop out of the Videotex program and into Basic, automatically.

It is very important that you follow the following steps precisely:

When you get the Basic ox prompt:

- enter EXEC &H8000
- immediately save the file to tape: CSAVE"FILENAME",A

This saves the file in the ASCII format, and is required to have the program saved in a form you can read back into your computer! Do not forget ,A!!

• Turn your computer off for 15 seconds, then turn it back on.

At this time, you'll come back up in Videotex, if you do not have the autostart defeated on your Videotex ROMpak. Hit the Break key a couple of times and you'll be back on-line with CIS at the SIG/Access prompt.

If you have the autostart defeated (see Steve Wegert's article in the March 1984 issue of **The Color Computer Magazine**, page 62) you will come back up in Basic once you turn the power back on. Enter EXEC &HC000 to re-start Videotex.

Should you run into problems downloading with Videotex, check your downloading steps very carefully. Most errors seem to be when folks forget to save the program originally in the ASCII format (i.e., CSAVE "FILENAME",A).

Need more help learning to download with Videotex? There is a special help file on the CCSIG with an expanded set of instructions, located in the X0 datafile. Just enter x0 at the main SIG menu and you'll be able to read the file.

Once you've downloaded a file, regardless of whatever terminal program you're using, you'll see the file name described again, along with the (R D T) prompt. Again, the R lets you read the file, D lets you download, and the T returns you to the top, the SIG/Access prompt.

That should get you started exploring the SIG/Access database system. In the next edition of this column, we'll look at some ways to make your excursions into the SIG library a bit more flexible, and save you some time and money.

I had planned to give a plug for a new Special Interest Group that should be of interest to Color Computer owners: the OS/9 Sig. Tragically, though, the system operator of the OS/9 Sig, Jim Bellomo, died unexpectedly late in February.

Jim conceived the idea of an OS/9 Sig on CompuServe intending a large part of the framework to assist the Color Computer OS/9 user, to assist the user to realize the full potential of this very powerful operating system. The groundwork laid by Jim will be carried on by another Sysop on the Sig, who should be on-line by the time this is published.

Jim Bellomo, age 34, will be missed not only by those who knew him personally, but also by those who met him only through their computers and terminals.

The OS/9 Sig will continue to offer a specialized meeting place for those interested in meeting other OS/9 users, as well as hosting the membership library of the OS/9 User Group, Inc., which will be available only to those members of the OS/9 User Group. An extensive public domain library is in place. To access the OS/9 Sig, go to page PCS-18 on CIS, or enter the command R OS9UG from the CCSIG menu or FUNCTION: prompt.

#### **SIG Suggestions**

Finally, a reminder about your CIS User ID and password.

The User ID and password you have is your key to the system, and just as you wouldn't leave the key to your house where anyone could get at it easily, you should also protect your password.

Never give your password except when you first log into the system. If for some reason you get "bumped" from the system, the safest thing to do would be to hang up and re-dial your access number.

Additionally, we recommend that you change your password frequently...once a month is not too often. Simply go to page CIS-175 and follow the prompts.

Remember, CIS holds you responsible for the security of your password, so

guard it carefully.

Should you have problems accessing the SIG, or questions about Compu-Serve's operations, you may call the CIS Customer Services office at (800) 848-8990 between the hours of 8 am and midnight (Eastern time), or leave a message for me on the SIG.

Enjoy the summer!

Ed. Note — Wayne wrote this column just after the birth of his first baby — a boy. Congratulations, Wayne!

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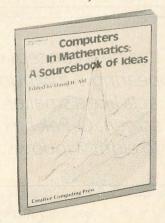
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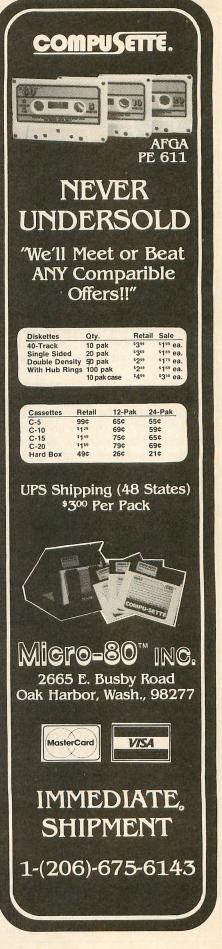


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PAK OFFERS THREE improvements to the OS-9 operating system. It lets your television set display many more columns and rows of text and block graphic symbols than the standard screen format. It has a character set editor for the dynamic creation or change of fonts, and it has a set of conversion utilities that accomplishes the bi-directional transfer of text files between OS-9 and Flex and between OS-9 and the Radio Shack disk operating system (DOS).

Microware Systems Corporation designed OS-9 and defined its standard output device on the Color Computer to be a screen of 32 columns and 16 rows. This specification allowed fast scrolling and the conservation of memory space because it was implemented using the alphanumeric mode and internal memory of the video display generator chip. Unfortunately, it also resulted in compromises which reduced the utility of OS-9. The standard screen limits many serious applications because of its smallness and its inverse (light on a dark background) video rather than true lowercase characters. These limitations are unpleasant for word processing applications since what appears on the screen looks different than what gets printed. Rather than changing the Color Computer hardware, Frank Hogg has introduced in O-Pak an improved screen driver that actually plots all text and graphic symbols on a grid of 256 by 192 pixels (dots). Now you can display information in formats like 51 columns by 24 rows, 64 by 27, and even 85 by 24. One simple command call from the OS-9 Shell is all that's required to change to a high resolution screen for text and block graphics:

OS9: HiRes [<character set name>]

There are twenty character sets, all variable in terms of character width, height, and foreground and background color.

Color options are the same as those OS-9 allows in its graphics mode. Each

character is displayed within a cell. The cell is usually larger than the character to allow for borders between adjacent characters. With a special O-Pak command this space can be reduced or eliminated. O-Pak permits spontaneous changes to the amount of vertical and horizontal cell space, too. Since inter-character spacing and inter-line spacing can be set independently, more characters and more lines can be placed on the screen virtually at will. Some sets, the very dense ones, are not readable on the screen, but have been supplied because they are useful for showing page format — which areas of a page contain information and which are blank.

There are also character sets that are rich in block graphic symbols, sets that are convenient, versatile tools for producing simple art. Graphics can be mixed with text since HiRes is in the graphics

"... a new concept is appearing... a window acts like a smaller screen. O-Pak has up to eight windows..."

display mode. Consequently, it's possible to construct, say, a fancy form on the screen that contains a logo, italicized field names, horizontal and vertical lines to separate rows and columns, and a simulated signature. Imagination is the only limit to this capability. Furthermore, if you had an Okidata Microline 82A printer and used the graphic symbols from the character set "mi82a," a close replica of the form on the screen could be printed on the Microline 82A. Suppose you have a different printer with different block graphic symbols. Described later is a technique that helps you define these block graphic symbols (in fact, any of the characters) for display on the screen.

Three other features of the HiRes screen are scroll rate, cursor selection, and windowing. Since the screen is fully controlled by software, display scroll speed can be changed at will from as little as one pixel at a time (smooth scrolling) to as much as 16 pixels at a time (jump scrolling). The style and blink rate of the cursor can also be selected. The cursor may be either an underline symbol

or a block symbol, and may be continuously displayed or blinked. The blink rate may vary from 1/60 of a second to over 40 seconds.

#### Windowing

Windowing, a relatively new concept in the computer field, is making its appearance on rather expensive microcomputer systems. A window is part of the screen that acts like a separate, smaller screen. There can be up to eight windows on an O-Pak screen, and each may be scrolled and manipulated independently. Each window has the line width defined by the character set and is divided from an adjacent window by an imaginary horizontal line.

One practical application for two windows is in word processing. Suppose you want to keep a help menu at the top of the screen while text is being developed below. The top area would be a small window that would be changed infrequently. The larger window below would contain text to be scrolled and moved as needed. There would be no need to recreate unchanged information when another area of the screen had to be changed. I expect to see many clever applications of the window concept for the Color Computer as HiRes gains wider acceptance.

#### **Function Control**

The many different functions of HiRes are controlled by the forwarding of special code bytes to the standard output path. For example, the hexadecimal character sequence 1B 43 creates a new window. An application program merely directs the appropriate code bytes to the standard output path using an OS-9 system call for line output. At the command level, it is customary to send code bytes from the shell by way of the Display command, such as:

OS9: DISPLAY 1B 43

Here is a summary of control functions for HiRes. OS-9 itself also defines controls for alphanumeric and graphic modes. Those controls are complementary to the HiRes functions and may be found in the OS-9 Commands manual from Tandy. Display Control Functions are:

1B 41: erase from cursor to end-of-line

1B 42: erase from cursor to end-of-window

1B 43: create a window boundary above current line

- 1B 44: combine current window with one above
- 1B 45: insert a line at cursor
- 1B 46: delete the line at the cursor, compress screen
- 1B 47: shift current line right by 8 character widths
- 1B 48: shift current line left by 8 character widths
- 1B 49: shift cursor one pixel right
- 1B 4A: change to character set whose name follows
- 1B 4B: shift cursor one pixel up
- 1B 4C: shift cusor one pixel down
- 1B 4D: shift cursor one pixel left
- 1B 4E: revert to a single window
- 1B 51: enable overstrike mode
- 1B 52: change to specified foreground color
- 1B 53: change to specified background color
- 1B 54: change spacing between characters
- 1B 55: change spacing between lines
- 1B 56: select block cursor
- 1B 57: change to specified blink rate
- 1B 58: change to specified scroll rate
- 1B 71: disable overstrike mode
- 1B 76: select underline cursor
- 1C: ignore all control codes but 1E 1E 1E and 1F 1F 1F
- 1E 1E 1E: accept all of the above control codes
- 1F 1F 1F: terminate HiRes and resume with standard 32x16 mode

#### Character Sets: What You See Is What You Get

If you do not find a character set to suit you, you can make your own with CSEdit, a utility that changes any of the given character sets and can add new ones. The beauty of this editor is that it is not necessary to sketch each character on paper, decompose it into pixels, and translate the pixel pattern into hexadecimal numbers. That old, cumbersome method now seems as archaic as finding square roots with pencil and paper instead of a calculator.

CSEdit draws a large image of the cell that contains the symbol to be modified. The cell is shown as a mosaic of squares where each pixel of a symbol is represented by one shaded square. Unshaded areas represent blank areas, like the space inside a character or between adjacent characters. The cell is drawn on a grid with as many horizontal positions as the width of the cell and as many vertical positions as its height. Every pixel can be individually selected by positioning a cur-

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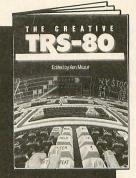
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## ---REVIEW\$

sor at its location. Shading is toggled on or off by keyboard control. Presto, instant customization.

Character editing is fun and gives me kind of an artistic feeling, too. Next to the mosaic of the character is the same character shown in normal size. As squares are toggled on or off in the mosaic, the mirror image in normal size changes correspondingly. I had no doubt about how the final edited version would look because it was right there before me. From now on, what I see on the screen is what I get on the printer.

CSEdit uses several menus to simplify setting the editing options. A six-choice main menu establishes a "home base" from which more detailed menus are called. The choices let you edit a character set, write a file, write a file and exit, abandon current work, execute a shell command, and change the HiRes mode.

During editing of a character set the edit submenu offers the choices of changing cell and character width and height; changing color set, foreground color, background color, and graphics mode; changing character shapes (by the technique described above); renaming the module which contains the character set; and returning to the main menu.

When writing a file users are prompted for the file name to save the character set as a data module. The revision and edition numbers of the module may be changed. (The revision number is important if this new module is to dynamically replace an older module in memory). Then the file is written.

In the write a file and exit mode, after getting a file name and writing the file, CSEdit returns to OS-9.

The abandon current work option is a graceful way of retreating from your own disaster.

Any shell command may be called from within the edit process. After executing a shell command, editing control is restored as though no interruption took place.

When changing the HiRes mode users are prompted for changes to make to the character set in use, not the set being edited. Subject to change are the character set itself, foreground color, background color, graphics mode, colors, height, and width.

#### File Transfer Commands

Before O-Pak file utilities, there was no convenient method for inspecting a file on a Flex or Radio Shack disk. There was no way to convert a text file or to transfer a file to another operating system. These limitations have been removed with the arrival of four new OS-9 commands: XDIR, XDUMP, XLIST, and XCOPY. They operate on files created by the Radio Shack DOS, Flex, and OS-9.

Each command satisfies a fundamental, unadorned service requirement. XDIR displays on the standard OS-9 output device the directory of a designated Flex or Radio Shack disk. XDUMP produces a combined hexadecimal and ASCII file dump on the standard output device. Similarly, XLIST lists a text file. XCOPY is more versatile. It can convert and transfer a text file from a Radio Shack disk to an OS-9 disk, from a Flex disk to an OS-9 disk, or from an OS-9 disk to a Radio Shack or Flex disk.

The O-Pak file utilities need parameters that specify operating system file types. A new separator (the percent sign) and three new prefixes are used to designate target or recipient file types: Type rs% for any file in the Radio Shack DOS format; flex% for text files with space compression in the Flex operating system; and flexb% for uncompressed (binary) files in Flex. No special prefix for OS-9 is necessary.

#### **Documentation**

The O-Pak manual has 42 pages of well written, well organized information. It even stacks neatly with OS-9 manuals. It has four chapters, two appendices, and an index. After an overview of features are installation instructions and documentation on HiRes. Implementation strategy is summarized and, since a nonstandard approach was elected by the software designer, an understanding of that section is essential if you are to create new master OS-9 disks. The next chapter describes the character set editor. It can stand alone but is most useful as a companion to an interactive session on the Color Computer. Chapter four describes the file utilities, and appendices list display control codes and a glossary of terms found in the manual.

O-Pak text files also contain good reference material and probably should be listed on your printer for future study should you buy this product. There is also a description of each of the twenty HiRes character sets on the disk.

My review copy of O-Pak, Release 001, dated November 30, 1983, is quite robust and behaves correctly in nearly all instances. The only errors I found were in the processing of responses to two menus. Here, my clumsy fingers and malicious responses caused OS-9 to lock up. If you have this release of O-Pak, be careful not to hit the Break key while entering data in the menu to change character width. Attempting to change the graphics modes from the HiRes menu also creates a lock-up. You might want to use the alternate method with the Display command instead of the editing function. It would have been better if O-Pak had rejected invalid responses.

#### **Performance**

When you use O-Pak you trade free memory space and speed for high resolution displays and versatility. The speed at which the display scrolls is affected in the HiRes mode since 6144 bytes of symbol data must be manipulated by software rather than automatically by the computer hardware. Although HiRes allows various scroll rates, in my opinion the speeds range from "slow" to "very slow." For most applications, I find this "slow" pace is rather comfortable, though. If speed is a temporary concern, HiRes can be turned off and recalled later.

File commands also suffer from largeness. They are considerably larger than HiRes because they must recognize and process disk and file formats for three operating systems. These are not small tasks. Respectively, the module sizes of XDIR, XLIST, XDUMP, and XCOPY are 14659, 14862, 15133, and 20151. These commands take a large percentage of memory space and use many disk sectors. I would not indiscriminately load these commands in memory or place them on my master work disk. Forethought and planning is in order if you are to make the most of this system.

High resolution displays may not look very clear on a standard color television set or even on a high quality color set that's being used as a monitor. Expect to see multi-colored ghost images of the characters. The difficulty stems from video circuitry, not from O-Pak. To improve readability, turn the color control on the TV set down. Clarity is improved even though you lose your background and foreground colors. If you are using a monochrome display, this problem does not exist.

If you are the type who plans to make a copy of OS-9 or to modify the kernel (guts) of this operating system, beware. HiRes should be turned off before performing a Cobbler command. CCIO must be in its restored state before requesting a Save of its memory module. Failure to follow this precaution will result in a CRC error in the CCIO module and will prevent a correct boot of the new kernel. If future releases of OS-9 change the CCIO mod-

ule an updated release of O-Pak will, I suspect, be necessary to keep in step.

O-Pak is among the most useful additions to my OS-9 library. This package has transformed an unattractive 32x16 screen to a display medium of convenience, even beauty. Perhaps my highest praise for HiRes is that I take its features for granted now and rarely need to be aware of its presence. Add to that the value of transferring files to other operating systems and you can see what a powerful collection of tools I now have.

— Eugene Grunby

#### Autoterm

PXE Computing 11 Vicksburg Lane Richardson, TX 75080 (214)699-7273 \$39.95 cassette, \$49.95 disk 32K

N TERMS OF INTELLIGENCE, Autoterm is a cut above many other smart terminal programs. It does everything its ads say it does, too. What sets it apart from greatness are a couple of documentation problems and operational kinks. Still, it's a fine program that can do even more than what it was designed to do, if you've got enough imagination.

The program requires at least 16K of RAM, which yields a storage buffer space of slightly over 2K. A 32K Color Computer, however, lets the program store up to 18,474 bytes in the buffer, a much more usable amount.

The review copy program came on an auto-run cassette, so it overwrites the reset vectors within the computer's RAM, and you do not have to enter EXEC or GO ... it starts up by itself. The disadvantage to this approach is that you can't escape the program without turning off the power, nor can you make a back-up copy very easily.

Autoterm supports a wide range of baud, parity, full or half-duplex, and stop bits, making it adaptable to a whole spectrum of host computers. In the terminal mode, you may choose between several formatting options, and have the ability to turn on the "key-beep" that "plinks" each time you press a key, or the "key-bop" that lets you know when you've made a mistake.

Word wrap, the ability to prevent a word from being broken in half at the end of a line, may be manually enabled or disabled, as can a reversal of the normal screen of black letters on a light colored screen to light green letters on a dark screen.

Printers are supported off line, though with an RS-232 switcher the modem can be left connected to the phone line while Autoterm routes something to the printer, and you don't have to restart Autoterm if the carrier drops for some reason. Several options make using this program a joy. One is the special printer driver, which embeds printer control codes to modify how the printer acts. For example, you can change from normal print to double width print.

One unique feature is the program's ability to override the length of a line of received text and re-format it to whatever application you want. Since the format of a line from a bulletin board system (BBS) isn't often the length your printer can print on one line, you can save some paper with this feature.

A simple text editor is included in Autoterm. It may be used to prepare messages off-line for later transmission, or to generate or modify a series of user-programmed text files known as Key Stroke Multipliers (KSMs). With a KSM you can set up a certain procedure, such as logging on to CompuServe or another electronic message service, and have the Color Computer do most of the work for you, like entering your name and log-on information, automatically reading messages, and saving them.

A large number of sample KSMs are in the instructions, including one which lets you program Autoterm as a mini-BBS. That one lets you get electronic mail even when you aren't home. The possibilities of such applications are endless.

Overall, Autoterm is a valuable addition to the Color Computer's communications ability. It has its own problems though.

The instructions fail to mention that when the buffer becomes full, the screen display changes by dropping all its blank lines. And the documentation does not explain that the buffer doesn't overwrite itself once it becomes full, erasing the oldest material in the buffer like most terminal programs do. Instead, it requires you to delete a portion of the buffer to make room for new data.

Take away another point for the lack of any means for the host computer (the one you're calling) to automatically open and close, or even mark, a portion of your buffer when downloading. Most Color Computer bulletin boards have adopted the defacto standard of the CONTROL-R / CONTROL-T protocol (hex numbers 12 and 14) to mark the beginning and end of a downloaded file. Instead, you must manually go through the buffer and mark the start and stopping points yourself.

Finally, a warning to CompuServe users: don't be surprised if you get an Invalid Password error message if you're a fast typist when you log on to the system. Autoterm waits one-fifteenth of a second for an echo from the host computer before it sends out the next character. Fast typists may be typing passwords faster than they're being sent out, since Autoterm is waiting to get something back and the password is not echoed back to your computer. The cure is to slow down, at least when typing your password. This lesson was learned after quite a few hours on the phone with CompuServe trying to figure out why my password wouldn't work any more.

This program is protected but all is not lost since PXE offers something that may make other software distributors sit up and take notice. For an additional \$23, PXE will sell you a "registered" and unprotected version of Autoterm, a workalike version of the regular program except for the following differences.

The auto-run leader is not present, so the cassette version may be backed up, or loaded onto a disk.

The program is written in position independent code, meaning you can relocate it anywhere within your available RAM. Using PXE's instructions, a 64K Color Computer can wind up with about 39K of buffer.

## "The possibilities ... are endless.

A set of technical notes accompanies the program, including a list of all jumps and calls to external routines, making modifications and customization much easier.

To get the "registered" version of Autoterm you must send in the application enclosed in the original Autoterm documentation. That way only authorized legitimate purchasers of Autoterm may buy the unprotected version.

- Wayne Day

### TRS-80 Color Mouse

Radio Shack One Tandy Center Fort Worth, TX 76102 (817)390-3885 \$49.95



HE COLOR MOUSE is a product intended to make game playing and graphics creation faster and easier. The Mouse connects to either joystick port and can be used with any program that supports a joystick. It also can be used with any Color Computer no matter

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which version of Basic or how much RAM size you have.

To use the Mouse, you push it around on any tabletop, within a 4.5-inch square. At the top left of the square the computer will read an X of 0 and a Y of 0. At bottom right the computer will read an X of 64 and a Y of 64. Other points in the square have appropriate X and Y coordinates. In that respect, the system is essentially the same as the joystick system.

To envision how Mouse works, imagine a trackball like the one on arcade versions of Centipede or Missile Command. Encase the trackball in a small black box, flip it over, and put a fire button on top. The trackball is spun by moving the box. The Mouse follows this basic plan, but its trackball is smaller and the cable comes out the back.

The Mouse is 3.5 inches long, 2.5 inches wide, and 1.3 inches high. The cable is five feet long with a joystick plug at the end. On top is the bright red bar of the fire button. The bar travel is about ½6 of an inch and clicks when it makes contact. The case is the same textured black plastic used on regular joysticks.

A look inside reveals sturdy construction, including a well-anchored cable, good solder connections, a steel trackball, and a heavy-duty momentary contact switch for the fire button.

The manual is a ten-page booklet that tells you how to set the Mouse up, how to use and care for it, and what its technical specifications are. It also suggests three Radio Shack program pak games the Mouse can make easier; Wildcatting, Polaris, and Galactic Attack. I don't have Wildcatting, but I did try this product on the other two. I found no improvement in Galactic Attack. Polaris, however, became a totally different game. I controlled the cursor much more easily, not only because of the larger movement area, but also because I could use one hand on the Mouse and the other on the keyboard.

The Color Mouse has three disadvantages. First, the cable tends to get in the way. I place my disk drive to the right of my computer and the Mouse cable tends to get caught under it. Second, it is nearly impossible to tell what the Mouse's X and Y coordinates are without a screen reference. To help, I drew a 4.5 inch square on a piece of paper and used the Mouse on that. Last, split-second movements sacrifice accuracy. The steel ball will slip instead of roll on the table when it is jerked or when directions are changed

quickly, so the Mouse simply can't match joysticks for speed. And the 4.5 inches of placement freedom make large fast movements necessary with some games, much more so than with the 2 inches of freedom allowed with joysticks.

There are things that can be done more easily with a Mouse than a joystick and vice versa. The Mouse is capable of very accurate and predictable placement, while joysticks are for registering reflex motions. But the Mouse does pretty much what Radio Shack says it will do. It's well-built, rolls smoothly, and adds zest to some games.

- L.R. Jansen

### **IntBasic**

Spectrum Projects 93-15 86th Drive Woodhaven, NY 11421 (212)441-2807 16K to 64K cassette only \$39.95

NTBASIC IS AN INTEGER Basic compiler program written to run under Color Basic in 16K, 32K or 64K machines.

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It compiles programs into machine code so they can run faster than with the Basic interpreter. It uses many of the familiar Basic commands and the usual mathematical and logical operators. A new command, IBSHFT, lets you shift the bits in any variable to the left or right. This command is functionally similar to the 6809 assembly language LSL and LSR operators.

As its name implies, IntBasic works only with integers. If you need to work with floating point numbers you will have to write routines that keep up with exponents and signs. IntBasic allows 26 integer variables, A to Z, each of which can be a 16-bit value from 0 to 65,535. It also allows 26 dimensioned "string" variables A\$() to Z\$(). Each string variable is an array of one-byte integers with values from 0 to 255. For example, A\$(5) refers to the fifth byte of the A\$() array. The length of each array is set by the Dimension (DIM) statement. IntBasic does not distinguish data types, so integer and string variables can be manipulated and compared in the same statement; the value of the specified byte of the string variable and the lower (less significant) byte of the integer variable are used. For example, the assignment statements A

= B\$(35) and F\$(10) = C are valid. The usual string operators RIGHT\$, LEFT\$, MID\$ and INSTR cannot be used. If you need these functions, you will need to write your own routines.

Now, this sounds like work. But if you want the speed of machine language you have to sacrifice some of the Basic's conveniences. You will need to learn "memory management." Specifically, you will need to plan where in memory to put the compiled program and a table for any text strings. You must be careful not to overwrite any portion of the original Basic or compiler programs. In addition, a library of subroutines in the compiler for multiplication, division, input and so forth must be in memory when your compiled program is executed. More planning is involved than usual, but the experience will be good if you want to learn assembly language program-

IntBasic comes on cassette in 16K, 32K and 64K versions. The memory requirements for the compiler vary from approximately 13K to 22K. Unfortunately, the 16K version leaves only 1764 bytes for the original Basic program, the compiled program and the text table. The major disadvantage of IntBasic is that it is not a

disk based system. I had almost forgotten how much I hate to find and load programs on tape. IntBasic also does not perform disk or cassette input or output functions. The users manual says you can tailor the existing ROM routines to perform these I/O functions.

The manual, a 19 page document, describes clearly and thoroughly everything you need to know to use the compiler. It is not an easy read because of the moderate complexity of the subject. A table of contents would help. It does contain four sample programs that can be used to learn the compiler. The first two can be run with 16K (although they are examples for a 32K machine) if the compiled program starts at 2000 (decimal) and the text table starts at 2500. Line 24 of the second program should be corrected to read: FORJ = 2 TO C: I+I+1: Z=PEEK(I): X=A\$(J).

During compilation, the compiler can generate listings on the screen and line printer to reproduce the original Basic program, and give the memory location of: each line of the compiled program; the first and last address of the text table, compiled program and variable table; and the start address of every integer and string variable.

— Raymond D. Mosteller

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### **Timebound**

by Children's Computer Workshop, Inc. Radio Shack One Tandy Center Fort Worth, TX 76102 (817)390-2842

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THE CHILDREN'S TELEVISION Workshop has filled our television screens with quality educational programming, fun, excitement, and challenge, for 13 years. So the creation of interesting educational software from its subsidiary, the Children's Computer Workshop (CCW), is hardly surprising. Timebound is part of that branch of the CCW family Tandy calls home-based educational programming; it's aimed at parents and children more than teachers and students.

The goal of any CCW game is to "encourage children to experiment and explore, to think and solve problems and to practice skills while they are having fun." Timebound, part of CCW's "Creative Ex-

ploration Series" for ages 10 and up, fulfills that goal but not in the cutesy tradition of Sesame Street nor with the comic book antics of The Electric Company. It's more reminiscent of the 3-2-1 Contact's intrigue

Timebound offers creative exploraton of a time loop between the years 0 and 2000. The game booklet is well-written and to the point, and within minutes I grasped my role as a scientist who must rescue a timebound assistant, Anacron. Despite my warnings to stay away from the Time Machine, Anacron didn't. He went tumbling out of control, frantically grasping historic events in an attempt to return to the present. I have only 15 minutes to retrieve him or my assistant will be timebound forever! So:

I am stationed at the Time Machine's viewing screen and in control of the Time Scanner (joystick). I check my starting year for this particular game on the calendar at the top of the screen — 1230. I take a deep breath, brace myself for action and begin traveling through time at high speed. The calendar changes rapidly as I pass through time bands. Events flash by, blurry with speed, as I move my scanner around the outer band hoping to

catch the event Anacron is clinging to.

My scanner catches an event and the view screen decides to freeze. The name of the event appears at the top of the screen and the calendar tells me what year I'm in. Anacron's location appears at the bottom of the screen and my heart starts beating faster! My event is "bicycle," the year is 1816, and Anacron is at "compass." The view screen divides the events in history into 11 categories so I check in the Timebound manual. I decide I'm in the "land transportation" category and that Anacron is in "scientific tools." I make a mental note of the position of the time scanner so I'll know where "land transportation" is. Category positions change with each game and I must discover and remember them so I can find Anacron's location. Now I concentrate on time sequence. Did we have compasses before we had bicycles? I feel pretty sure we did so I press the red button on the joystick to resume the search. I also press the spacebar to change direction.

Suddenly I'm plunging backward in time. Years are melting away as I frantically rotate the scanner around the view screen. The clock continues to display elapsed time. I've already used nearly five

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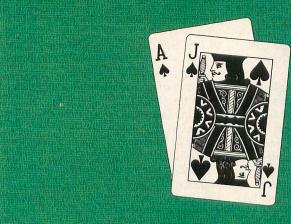


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## ---REVIEW\$

minutes! I catch one event after another as I memorize the category positions and link events with their dates in history. I approach the year 1125 and hear a "beep." My scanner catches an event and the view screen freezes action once again. My heart sinks. I've caught Anacron's event, but as I've moved closer to him I've created a time wave that has caused him to lose his grip. I have "compass" in the year 1125 but Anacron is no longer there. He has tumbled to another event, perhaps even another category. I've used over nine minutes now.

I press the red button and the years fade back to 0. I hear a series of sound effects and the year 2000 appears. I'm through the time loop now. As the 1990s pass I catch another event. It's 1990 and I'm on "hot tub tennis"... no kidding! Now that's something to look forward to. Huh? Oh yes! Anacron, hang on, I'm on my way!

Timebound can be just that exciting in the hands of the right person, young or old. But since the graphics are limited and unvarying, and the reinforcements simply faster personal times and achievement of each of the 11 difficulty levels, I recommend Timebound for very curious children with above average attention spans. And since memory and reflex action will be developed while playing Timebound, beginning play with at least some skill in those areas is important.

Catching an event with the scanner is a matter of luck of being in the right place at the right time. Granted, the point of the exercise is to develop a sense of history, but I'd still like some control there and I'd also like some occasional hints when I get within a reasonable range of Anacron. If you don't know what an event is, you have no way of knowing how close to Anacron you are and you're left guessing through centuries until you catch a familiar event. And, when Anacron is on an event you're not familiar with you must simply play blindly until he changes events or you accidentally stumble upon him.

The higher the game level, the more categories Anacron will use and the faster the scanner will move. When you catch Anacron he appears on the screen as a large question mark with eyes, at the appropriate category position and with sound effects. If you fail to catch him in 15 minutes you'll hear a sound effect and the screen action will freeze. In either case, a new game can be started by pressing the Clear button.

The categories that divide the game's historical events are: air and space, time, communication, land transportation,

water transportation, architecture, fun and games, scientific tools, political leaders, household items, and sports. If you want to learn about a specific category you can keep the scanner in that particular spot on the screen to catch all the events offered in that game. Of course you may not catch Anacron that way, but it's a good way to get familiar with Timebound.

I enjoy playing Timebound but, more importantly, my ten-year-old son enjoys it, too. In fact, he read the manual on his own and was soon finding Anacron faster

Many names and events included in the game are a mystery to young minds, though. Genghis Khan, Hadrian, Eniac, and Carrrack, for example. Even things like a pressure cooker, candle clock, and sextant can be strange to them. My son learned to hold the scanner to catch an unrecognized event until further events identified the category. That solved some of the mystery. A dictionary and encyclopedia satisfy extreme curiosity when a game ends. Occasional adult participation will help children learn unfamiliar categories and will encourage activities like the riddle-solving at the end of Timebound's manual.

How well I remember agonizing for long, boring hours, trying desperately to memorize events, names and dates for school exams. Timebound... welcome.

- Jean Plesser

### **Factory**

Sunburst Education 39 Washington Avenue Pleasantville, NY 10570 32K disk \$39.95, regular \$49.95, teacher's edition

S A COMPUTER-USING educator, I am constantly urging children to attack a large problem by breaking it down into small parts. By solving each part step by step, the larger problem can be solved. The Factory by Sunburst is a superb way to teach this problem-solving strategy. It requires mental dexterity, careful observation, and planning.

There are three levels in Factory. In the first, called "Test a Machine," students experiment with the three machines that are used in the factory. Students' creativity can emerge in the second level, "Build

a Factory," as they design products, program an assembly line, and challenge other students to produce the same product." In the third level students are asked to work backwards and determine what processes were needed to construct a product. In order to do that, they must know the function of each machine and devise a sequence that can make that product.

Test a Machine, level one, lets the kids try each machine to see what effect it has on the raw material, a plain, blank square. The three machines either PUNCH, ROTATE, or STRIPE. Each machine has its variations, too. For instance, ROTATE will let you turn the square 45, 90, 135, or 180 degrees before sending it on down the assembly line. Colorful graphics depict the machines in operation, and sounds are made each time actual "work" is done.

The second level allows up to eight machines to be set up in an assembly line. If the students PUNCH a square in the center, ROTATE it 45 degrees, and put a thin STRIPE on it, the finished product will be a diamond-shaped disk with a diamond hole in the middle and a horizontal stripe running through the mid-line.

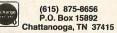
When students finish creating an assembly line, the gears in the factory move and the finished product is graphically produced. Then the computer asks if they want to challenge others to make their product. Students delight in devising elaborate products to challenge their friends.

In the final stage of Factory, students see a product that has been made by several machines. They are asked to reconstruct the sequence of machines and processes its creation required. The computer gives the choices of easy (two machines), medium (up to four), and hard (up to eight). Students must think backwards and assemble the required machines, then the product will be put through the new assembly line. It appears on the screen next to a depiction of the original. If the student-devised product varies from the original the computer declares, "YOUR PRODUCT HAS A FLAW." Students can then try again or start a new product.

There is no limit to the number of times the students may attempt reconstruction. This feature encourages the young engineers to take careful notes, learn from their mistakes, and discuss possibilities with others. At any time they can stop what they're doing and return to the main menu. The BACK UP choice is also constantly available, allowing them to return to their previous choice. Documentation is complete and useful.



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## --- REVIEW\$

One sixth grader suggested that Factory would be a good training device for the Olympics of the Mind Competition, a nationwide creative problem-solving event now in over 3000 schools. Many problems in this competition are of the mechanical type. Students must learn that mechanization is, in actuality, a series of parts with each part assigned one specific task. Factory teaches this concept as well as any activity I've seen. The versatility of Factory satisfies my expectations for good simulation. It can be used by fourth graders and adults, and is applicable for individual and for group instruction.

— J. Craig Dickinson

### Video Plus

Computerware Box 668 Encinitas, CA 92024 (619)436-3512 **\$24.95** 

TELEVISIONS ARE FINE for many computing applications, but if you do much word processing you probably suffer from occasional eye fatigue and headaches. A high resolution monitor is much better to work with, especially when you're using programs that generate video displays of up to 85 characters per line.

On a television, displays above 51 characters per line are next to impossible to read. With a high resolution monochrome monitor, such character display, even 86 character displays, can be more easily read. Unfortunately, one of the biggest drawbacks of the Color Computer is the fact that it does not, in its standard configuration, easily lend itself to a marriage with a high resolution monitor.

The problem arises when you try to connect a high resolution monitor to the Color Computer's video jack. That jack was designed for output to a television set and therefore uses radio frequencies. It will not work with a high resolution monitor. In order to use a monitor you need raw signals from inside your computer. Several articles that describe exactly how to do that have appeared, but they are technically oriented and require some degree of expertise to implement. I had almost resigned myself to the idea of living with unhealthy television displays when I heard about Video Plus.

Video Plus is a hardware device that gives you a connection for monochrome or color high resolution composite monitors. I was skeptical of the "installs in minutes" claim, as I have heard that one many time before. Video Plus, to my surprise, lives up to the claim.

I timed my installation, beginning with the first reading of the installation instructions. It took me 11 minutes, including time to read the directions twice, take the cover off the computer, install Video Plus, and reinstall the cover.

The instructions are completely clear and the package contains a preassembled and tested unit. To install, you simply remove one IC chip (easily identified in the instructions), install a socket and replace the chip in the socket. All the wiring and soldering has been done for you. Next, you simply stick the small Video Plus board (it comes with a self-adhesive bottom) somewhere convenient and you are finished. All cables are included and are prewired. Most of your thinking will center around finding a convenient place in the case through which you can route the cables.

Video Plus comes with a sound patch too, so you can capture signals from software that generates music, speech or other sounds.

When you are finished with installation you have about two feet of video cable with a male RCA jack on the end that plugs into your high resolution monitor. You also have another cable with a female RCA jack that connects the audio. Since most monochrome monitors do not have speakers, you may have to capture the audio output with an external amplifier such as a tape recorder or

"I leave my work station with eyeballs clear and wits intact."

radio, using an auxiliary input jack. I use a small, battery operated amplifier. You'll also need a patch cable with a male RCA jack on one end and a standard phono plug on the other.

All right, all right, I can hear you. You're saying, "So far so good, but what about our COLOR!?" Well, if you want to use a high resolution color monitor, you can, even though Video Plus comes set up for monochrome. What it normally does is strip the monochrome signal and

eliminate "irrelevant" color signal information, since monochrome monitors have no need for it. That gives you an outstanding monochrome display, complete with all shades of grey. If you want color, you cut one wire loop to preserve the necessary signals. If you wish, you can wire a small switch to the wire loop and locate it somewhere that lets you switch back and forth between color and monochrome signals.

The unit includes an adjustment that lets you find the optimum signal for your monitor. Another plus is the fact that your standard TV output is not disabled.

Video Plus is an outstanding product that does everything it lays claim to. I now enjoy the sharp, clear, and interference-free display that is possible only with a monitor. And I leave my work station with eyeballs clear and wits intact.

— Norman Garrett

## **Mailing List**

Prickly Pear 9234 East 30th Street Tucson, AZ 85710 (602)886-1505 32K, disk drive \$49.95, disk only

FYOU HAVE NEVER used a label-making data-base program, Mailing List may be a good place to start. It's friendly and comes with instructions to customize it to your particular computer-printer combination. It is, however, less than flexible in setting up fields, and slow in sorting.

The main reason it's friendly and easy to customize is that it is a combination of two Basic programs and one assembly language program. The Basic programs are Mail and Alpha; the assembly language program is Screens, a high-resolution screen program that's automatically called in by the main program, Mail. You get a choice of two screen colors with Mailing List, a light one, which is a white background with black characters, and a dark one, which is a green background with black characters. The dark seems to produce the least amount of eye strain.

To start Mail, all you have to do is type in RUN "MAIL" and hit the Enter key. You will be asked if you intend to start a new file, the file name, and your screen selection. After you answer those questions you reach the main menu. The main menu has seven choices. They are, Start/

Add, Review/Edit, Print All, Print Particular, Print Phone Numbers, Load New File, and End Program.

The data base for this program is composed of six fields; Name, Address, City/State, Zip Code, Phone Number, and Code. One weakness in this program is its inability to have more than one Name

"Mailing List is friendly and easy to customize... but slow."

or Address field. Many times when you are preparing mailing labels you need to use more than one address line, and sometimes you need to mark a label to someone's attention. That can not be done neatly with this program.

Another hang-up that detracts from Mailing List catches you after you have started a new file and have entered a number of records. At that point you might want to edit them. The program won't let you do that unless you first end it and rerun it. This only happens the first time you start a new file, but it is annoying.

What Alpha does is let you copy or sort the data files produced by the Mail program. Alpha sorts the Name field either by the first or last names. All sorts are in ascending order. To change the sort field you must take the trouble to change Line 400.

To sort addresses you end the Mail program, turn the computer off and back on, type in RUN "ALPHA", and hit the Enter key. This clears the computer and removes the Screens program. Alpha will not run with Screens in place.

The sort is a modified bubble sort. It is very slow. It took 12 minutes to sort 60 records. Also, all sorting is done on the disk, so my disk ran for the full 12 minutes. Prickly Pear acknowledges the sort is slow and suggests that any large sorts (1000 or more) be done overnight. If your disk drive is like mine and is rated at 200 to 300 hours, it's not smart to run it for hours on end.

This program would make a good starter program for someone learning about data bases, but its price is what you'd expect to pay for a professional business program, not one in which you have to change a line in Basic to change the sort field. Perhaps at half the price, this would be a good buy!!!

- Bob Jack



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## ---NEW:PRODUCT\$

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by Gary Phillips and Guier S. Wright III The Book Company 11223 South Hindray Avenue Los Angeles, CA 90045 (213)410-9466

Okay, first things first. There are two of these publications, one for the Models I, III, and IV, and one for the Color Computer and MC-10. This announcement regards the latter. It's 241 large pages long and costs \$14.95. It's cross-referenced and includes listings of software houses and product information. It's written for beginners and experienced users.

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#### The Naked Computer

by Jack Rochester and John Gantz William Morrow & Co. 105 Madison Avenue New York, NY 10016 (212)889-3050

The Naked Computer promises to be an eclectic and entertaining compilation of computing fact and trivia. It's got history (like why Hal sang "Daisy, Daisy"). It's got the words to the "official IBM fight song, banned since 1957." It has a serious side, too, including chapters on robotics, artificial intelligence, and computer art. Produce \$15.95 and the 335-page hardcover book is yours.

#### The Whole Computer Catalog

Designs III Publishers 515 W. Commonwealth Avenue Fullerton, CA 92632 (714)871-9100

The Whole Computer Catalog sounds like it wants to be all things to users. The \$35, paperback, 400-plus page catalog offers information on a host of subjects. Some are: hardware, software, applications,

education, careers, stores, associations, magazines, government publications, books, manufacturers, consultants, the sociological impact of computers, and "sources to find solutions to immediate problems."

#### Quarterly Software Reviews

Whole Earth Software Review Box 27956 San Diego, CA 92128

From editor Stewart Brand, who brought you the Whole Earth Catalog, comes the Whole Earth Software Review, a research project/publishing venture that's to culminate later this year in yet another Whole Earth tome, you guessed it, the Whole Earth Software Catalog. Brand and staff are focusing on "the best" personal computer software, hardware, and books as objectively as possible and without, a promotional pamphlet says, any advertising whatsoever. They are winnowing the best from the rest by relying on reader opinion and experience, and an in-house research staff. The Review, its promo promises, will be enthusiastic in tone, not condescending or overly technical. It costs \$18 for four issues if subscribed to; the cover price is \$5 per issue.

#### Machine-Language Subroutines for the Color Computer

Wayne Green Books Peterborough, NH 03458 (603)924-9471

Machine-Language Subroutines for the Color Computer, by David D. McLeod, is a reference book, not a tutorial, for computer users already familiar with assembly language programming. Its four sections are titled Preliminary Information, ROM subroutines, RAM subroutines, and Appendices. Most routines in the book can be combined with Basic programs. Entry requirements, exit conditions, and error interpretation are discussed. Included is a cassette with the source codes. It is compatible with Radio Shack's EDTASM + and Micro-Works' Macro-80C disk editor/ assembler. The package sells for \$29.97.



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f a single goal throughout all of time can be determined for all mankind, it would be the desire to live a pleasant existence. Pleasure, happiness — more than mere survival — is what fuels our desire to live. Our history is full of wars and op-

pression that illustrate how far we've come and how much further we still need to go. Our attempts to attain that desired pleasant life have been wide-ranging, as evidenced by such diverse extremes as global organizations like the United Nations to localized debates over providing sufficient parking areas downtown.

The desire for a pleasant existence and our continuing search for methods to bring it about is what history is made of. Our search drives us to discovery and artistic expression. Co-existence, the first ingredient for a pleasant existence, would be impossible without an ability to communicate. The threat of all-out nuclear war seems more real today than it did a few years ago; not because our weapons are bigger and more powerful, but because the leaders of the US and USSR aren't talking together.

As society continues to elevate itself via newer, slicker, and faster technologies, our means of communication must keep pace. Until the microcomputer we depended on the telephone. Before that we used radio transmission, telegraph, fast horses, and slow boats.

Many people are asking, "Exactly what does one do with a microcomputer?" We use it to communicate with each other and with ourselves. We use it to store, manipulate and exchange information. People who dismiss the microcomputer as an adult toy are making a terrible mistake.

Reports of the multitude of privately-owned microcomputers that we hear so often are not marketing hype, nor is this a fad phenomenon that will soon die a death similar to the hoola hoop, home video systems, and Tony Orlando and Dawn. We are well into the beginning of another major epoch of human history. "The Information Revolution" will be viewed historically like the artistic Renaissance of the late 14th century and the Industrial Revolution that began in the late 1700s and continued until it collided head-on with the transistor.

In the overall scheme of things, microcomputers will probably become a subsection of a chapter on digital communication technology in a history text called *The Dawn of The Information Age*. In volume two of that yet-to-be-written historic text, microcomputer history may be compressed to a single paragraph or pair of sentences. Still, no matter how miniscule the microcomputer becomes in history's grand retrospective, its effect is quite the opposite in our daily existence. The way we conduct business, teach and learn, shop, correspond, etc., etc., has forever been changed because of the increasingly affordable microcomputer. We can watch that change happen on an almost daily basis.

Although the Information Age did not begin with microcomputers, microcomputers may prove to be the catalyst that brings the Age out of its infancy. The Information Age began with two relatively unrelated inventive feats: Daguerre's invention of photography in 1839, and Bell's telephone in 1876. Public radio broadcasting emerged in the 1920s, bringing events otherwise widely displaced by time and distance into radio listeners' present existence. In 1936 radio's sound broadcasting technology merged with the process of making pictures. The result was television, which made those faraway occurrences nearly as real and immediate to viewers as to participants. Many lesser, albeit important, advances continued to refine the art of transporting and communicating

information. Concurrently, industrial technology made individual ownership of communicating devices widely affordable. Soon few houses were without a radio, and not long after a TV, and then color TV.

Technology marched on, from the tube to the transistor to the printed circuit board to the silicon micro chip, depositing radios, TVs and computers in its wake. It's difficult to believe now, but when TV broadcasting was in its infancy few people foresaw a large public acceptance of the media. It wasn't long before that assumption was proven false. Soon everyone knew the voices of Uncle Milty, and Jack's Armstrong and Benny. As the voices became faces on the television screen, listeners became viewers. Soap operas, comedians and music made the technology easy for the public to absorb.

Then this pleasant form of communication began to get serious: we watched presidents talking to reporters, racial violence came into our living rooms, and a war from a far off corner of the world continued every evening at 6:00. The electronics did not always make us feel good now. Information, for better or for worse, was communicated to America live and in color. In 1963 America buried a president, and the whole world went to his funeral.

Although Bell's telephone invention seems to have taken place many more years in the past than it actually did, modern communications technology is *that* young — merely 108 years old. In a retrospective of historical events, it is easy to realize how few years of development led up to the microcomputer. The Renaissance lasted nearly 300 years. The Industrial Revolution put in close to 200 before the transistor was born. Epochs have no time length requirements to follow, they are at the mercy of history. Without a sure-fire way to look to the future, there is no way to determine at what point we are now in The Information Age.

Realize, though, how history will transform events into matter-of-fact happenstance. I condensed modern communications history to a pair of paragraphs, the transistor to an off-the-cuff remark exemplifying the end of the Industrial Revolution, and suggested that the microcomputer would be awarded even less space in tomorrow's history books.

People commonly make two mistakes when faced with today's focus on the microcomputer: they ignore it, hoping it will fade away, or become deathly afraid they'll sleep too late one morning and miss a brand new product announcement. Now that the microcomputer has arrived and dug itself into our lives, we need to be realistic about what it means. We have reached only a juncture in human history, not a concluding episode.

— K.L., Editor-in-Chief

## ---FOR...NEXT (07,84)-

THE JULY ISSUE of **The Color Computer Magazine** will take a look at operating systems. We'll have a review of one of the CP/M versions out for the Color Computer, and some articles that will help you understand what an operating system is and does. Jean Plesser will present the first of two special articles for kids on their summer school break, and we'll have the last winning game from last year's Summer Programming Project. And that's just the beginning...



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